

Species Composition and Biogeography of Tropical Montane Rain Forest in Southern Yunnan of China

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Abstract

The species composition, physiognomy and biogeography of tropical montane rain forest in southern Yunnan, SW China, have been studied based on data from 10 sampling plots and a complete floristic inventory. Two separate communities are recognized: a *Mastixia euonymoides*-*Phoebe megacalyx* forest and a *Parakmeria yunnanensis*-*Gymnanthes remota* forest based mainly on species composition and forest structures. The tropical montane rain forest is characterized by evergreen meso-phanerophytes and micro-phanerophytes with simple, leathery and entire mesophyllous leaves, more or less frequent woody lianas and epiphytes, abundant herbaceous phanerophytes. However, it has few buttresses or cauliflory in physiognomy. The montane rain forest has similar species diversity to the lowland seasonal rain forest in the region. This indicates that species richness is not necessarily reduced with increasing altitude. We suggest this rain forest is a type of lower montane rain forest based mainly on its physiognomy, structure and floristics, but one that occurs at a higher altitude than those in equatorial SE Asia. The montane rain forest is dominated, in terms of species richness, by Lauraceae, Euphorbiaceae, Fagaceae, Theaceae, Rubiaceae and Papilionaceae, but by Lauraceae, Magnoliaceae, Euphorbiaceae, Fagaceae, Mastixiaceae and Nyssaceae in terms of phytosociological importance. In floristic composition, a total of 623 native species in 327 genera and 115 families of seed plants were recorded from the montane rain forest, of which recognizably 'tropical' elements contributed about 78.9% at the generic level and more than 80% at the specific level. Plants of tropical Asian distribution contribute 63.7% of the total sum of species. We conclude that the montane rain forest has strong tropical Asian affinities floristically even though it occurs at the northern margin of mainland SE Asia and at a higher altitude.

Introduction

Southern Yunnan in southwestern China is exceptionally interesting to botanists because of its diversified biota and unique geological-biogeographical history. The region is the most species rich and has the largest tropical-subtropical forest cover in southern China. Geographically, the region is at a transitional zone between tropical Southeast Asia and subtropical East Asia, and is also to be at a conjunction area between the Shan-Tai fragment of Gondwanaland and the southeastern margin of the Asian continent, geologically (Fortey et al., 1998, Metcalfe, 1998). Accordingly, southern Yunnan is a key area in biogeography as well as being a global 'hot spot' for biodiversity (Myers, 1998).

The vegetation of southern Yunnan was mentioned, albeit briefly, for the first time by C.W. Wang in 1939 (Wang, 1939), but little was known until late 1950s because of poor access to the area. Many studies on the tropical forests in southern Yunnan have been done in the past, although little has been published in English (Zhu, 1992, 1993; Wu, 1987; Jin, 1997; Cao, 1996; Cao & Zhang, 1997; Zhu, 1997; Zhu et al., 1998a, 1998b, 2003, 2004; Zhu & Roos, 2004). Previous work on the forest in southern Yunnan has been restricted, largely, to the tropical rain forests at lowland sites below 900 m in elevation. The tropical montane rain forests are still poorly known (but see the descriptive works of Wu, 1987; Wang et al., 2001; Zhu et al., 2004).

Pristine montane rain forests were discovered recently at Mengsong in southern Yunnan, in the border between Myanmar and Yunnan (Wang et al., 2001). The montane rain forests occur in valleys and on some mountain slopes between 1500-1800 m and are a type of 'lower montane rain forest' according to Ashton's (2003) categorization of altitudinal forest zonation in Southeast Asia.

Montane forests and their altitudinal zonations in tropical southeastern Asia have been studied by a great many authors since Brown (1919). The more important of these include Steenis (1935, 1984), Whitmore & Burnham (1969), Whitmore (1984), Ohsawa et al. (1985), Ohsawa (1991, 1993, 1995), Kitayama (1992), Nakashizuka (1992), Pendry & Proctor (1996), Aiba & Kitayama (1999), Buot & Okitsu (1999) and Ashton (2003). It has been accepted, commonly, that there is an ecotone between the tropical lowland forest and lower montane forest with changes in physiognomic, structural and floristic attributes, occurring usually between 900-1200 m altitude. The montane rain forest in southern Yunnan occurs at much higher altitudes on the northern margin of tropical Southeast Asia. Its physiognomy, floristics and biogeography are accordingly of special interest.

Site Description

Southern Yunnan is located in the southernmost part of Mainland China (**Figure 1**). It borders Myanmar and Laos, and has a mountainous topography with the mountain ridges running in a north-south direction and becoming lower in elevation southward. Altitude ranges from 480 m at the bottom of the lowest valley in the south (Mekong River) to 2429.5 m at the top of the highest mountain in the north. The Mekong River traverses the region from northwest to southeast (Xu & Jiang, 1987).

Mengsong is an administrative district in the west of southern Yunnan occupied by Hani people, an indigenous ethnic group. It is located in the border between Myanmar and Yunnan. Topographically it is a high basin surrounded by mountains, and varies in altitude from 1557 m within the basin to 2100 m at the top of the surrounding mountains. The region has a monsoon climate. From the climatic observation at 1600 m elevation, the mean annual temperature is 16.7 °C; the extreme minimum air temperature is 1.7 °C, the maximum air temperature, 28.5 °C, and the annual temperature accumulation (the sum of daily temperature means of > 10 °C), 6083 °C. The mean annual precipitation is between 1800 and 2379 mm. More than 80% of the precipitation falls during the rainy season between May and the end of October, and the annual mean relative humidity is 83.4%.

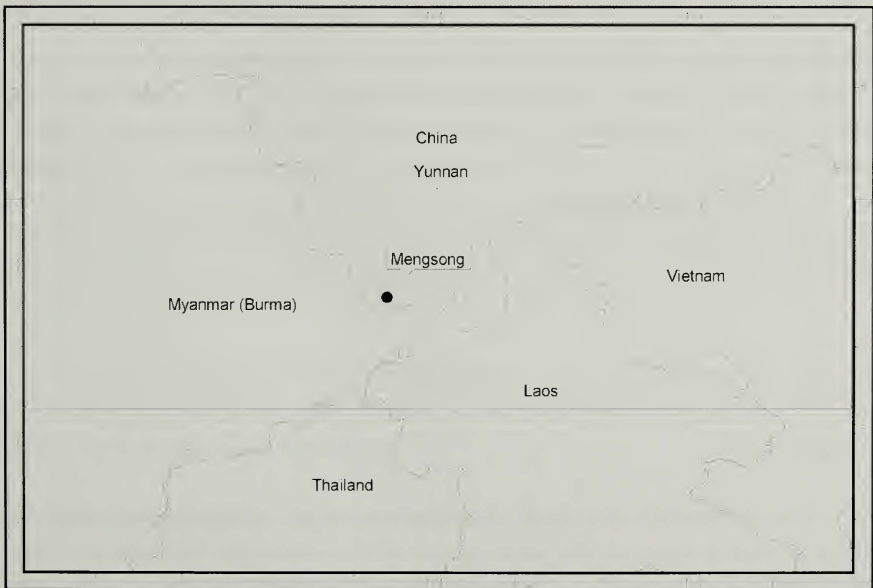


Figure 1. Map showing the location of Mengsong region in Xishuangbanna, southern Yunnan.

Methodology

The study was conducted in two stages: First, there was a general, landscape-scale, floristic inventory of the tropical montane rain forest in Mengsong, in which all plant species in the forest were recorded and specimens collected whenever possible. When habitat-related floristic variation had been identified, a systematic plot-based study was carried out. Five sampling plots, each 25×20 m in size, were established in each assemblage in order to characterize the floristic variation. All trees in these plots were identified and their dbh (minimum 5 cm), height, and crown cover were measured. In each plot, five 5×5 m sub-plots were established to facilitate floristic survey of the understorey. In these sub-plots, saplings, shrubs and herbaceous plants were counted. Lianas in these plots were identified and their abundance estimated. The Importance Value Index (IVI), suggested by Curtis and McIntosh (1951), was calculated. Physiognomy (life forms and leaf sizes) was analyzed using Raunkiaer's criteria (1934) as revised by Mueller-Dombois and Ellenberg (1974). Webb (1959) split off the lower end of Raunkiaer's big mesophyll class ($2025 - 18225 \text{ mm}^2$) as notophylls ($2025 - 4500 \text{ mm}^2$), which is to be preferred for detailed categorization of leaf size spectrum. Nonetheless, Chinese botanists and their local audience are familiar with Raunkiaer's big mesophyll class. Accordingly we retain the big mesophyll class of Raunkiaer in this analysis.

Based on intensive floristic inventory of the forest, a more or less complete species list has been compiled, from which the floristics and geographical elements have been analyzed. Physiognomic comparisons between the montane rain forest and lowland rain forests in southern Yunnan and the equatorial tropics, and other montane rain forests in Southeast Asia have been made to demonstrate further the characteristics of the Yunnan montane rain forests. Specimens were identified and voucher material is lodged in the herbarium of Xishuangbanna Tropical Botanical Garden (HITBC). Species authorities follow the recently published and still ongoing project of "Flora of China".

Results

The vegetation

Based mainly on their habitats, species composition and forest profiles, we have divided the vegetation of the montane rain forest into two distinct assemblages which we have named based on their dominant and subdominant species, *viz.*:

1 *Mastixia euonymoides*- *Phoebe megacalyx* forest;

2 *Parakmeria yunnanensis*- *Gymnanthes remota* forest.

Mastixia euonymoides- *Phoebe megacalyx* forest ('ME-PM')

The ME-PM forest occurs mainly in wetter montane valleys. The forest has usually two tree layers. The upper layer is up to 35 m high with a crown cover of 70-80%, and is dominated by *M. euonymoides*, *Manglietia hookeri*, *Michelia cavaleriei* and *Nyssa wenshanensis* var. *longipedunculata*. In some sites *M. euonymoides* grew sufficiently tall as to be considered as emergents. The lower tree layer was further divided into two sub-layers in some sites. The upper sub-layer was 10-20 m high with a crown cover of 60-70%, and was dominated by *Phoebe megacalyx*, *Syzygium brachythyrsum* and *Dysoxylum binectariferum*. The lower sub-layer is 5-10 m high with a cover of 40-50%. The most frequently encountered species are *Ardisia thyrsoiflora*, *Cylindrokelupha kerrii*, *Ostodes kuangii* and *Brassaiopsis lepidota* (see **Appended Table 1**).

The shrub layer is up to 1-5 m high and is dominated by juvenile trees. The most frequently seen shrub species are *Psychotria symplocifolia*, *Brassaiopsis fatsioides*, *Mycetia gracilis*, *Brachytome hirtellata* var. *glabrescens* and *Oxyspora vagans*.

The herbaceous layer is well developed with a cover of 50-70%. Frequent species are *Ophiorrhiziphyllom macrobotryum*, *Allantodia dilatata*, *Ctenitopsis* sp., *Microsorium dilatatum*, *Porandra scandens*, *Rhynchotechum obovatum* and *Strobilanthes* sp.

There are a few lianas, but some big woody individuals belonging to species such as *Epigynum auritum*, *Bousigonia angustifolia*, *Calamus nambariensis*, and *Gnetum montanum* are present.

Epiphytes are abundant. They include *Pothos chinensis*, *Neottopteris nidus*, *Rhaphidophora hongkongensis*, *Aeschynanthus bracteatus*, *Pholidota imbricata* and *Asplenium normale*.

Parakmeria yunnanensis- *Gymnanthes remota* forest (PY-GR)

The PY-GR forest occurs on shady slopes and the tops of hills. The forest is 25-30 m high with a very even canopy. It also has two tree layers. The upper layer with a crown cover of 80% is dominated by *P. yunnanensis*, *Nyssa*

wenshanensis, *Cinnamomum javanicum* and *Calophyllum polyanthum*. The lower layer is at 5-20 m with a cover of 70-80%, and is dominated by *G. remota*, *Syzygium brachythyrsum*, *Xanthophyllum yunnanensis* and *Wendlandia pingpiensis* (see **Appended Table 2**).

Appended Table 1. Importance Values Index (IVI) of tree species in *Mastixia euonymoides*- *Phoebe megacalyx* forest.

Altitude: 1650-1780 m	Height of canopy: 35 (m)			
Plot number and size: 5 (25×20) = 2500 m ²	Coverage: > 90%			
Slope degree: 10-35	No. of sp. (>5 cm dbh): 62			
	No. of stems: 263			
Species name	RA	RF	RD	IVI*
<i>Mastixia euonymoides</i>	0.76	1.64	23.46	25.86
<i>Phoebe megacalyx</i>	9.13	4.1	6.00	19.22
<i>Syzygium brachythyrsum</i>	9.51	4.1	3.01	16.62
<i>Dysoxylum binectariferum</i>	9.51	4.1	2.35	15.95
<i>Manglietia hookeri</i>	0.38	0.82	14.14	15.34
<i>Michelia cavaleriei</i>	1.9	2.46	8.73	13.09
<i>Nyssa wenshanensis</i> var. <i>longipedunculata</i>	1.52	2.46	7.12	11.10
<i>Linociera insignis</i>	4.94	3.28	1.66	9.88
<i>Ardisia thyrsoiflora</i>	4.56	4.1	0.87	9.53
<i>Cinnamomum javanicum</i>	2.66	3.28	3.21	9.15
<i>Helicia pyrrhobotrya</i>	4.18	3.28	0.58	8.05
<i>Calophyllum polyanthum</i>	2.66	3.28	1.72	7.66
<i>Ostodes kuangii</i>	3.8	2.46	1.38	7.64
<i>Xanthophyllum yunnanensis</i>	3.42	3.28	0.88	7.58
<i>Brassaiopsis lepidota</i>	2.28	2.46	1.90	6.64
<i>Cylindrokelupha kerrii</i>	3.8	2.46	0.29	6.55
<i>Cryptocarya rolletii</i>	3.04	3.28	0.17	6.49
<i>Alcimandra cathcartii</i>	1.52	2.46	2.29	6.27
<i>Litsea vang</i> var. <i>lobata</i>	1.52	3.28	0.13	4.93
<i>Litsea lancifolia</i> var. <i>pedicellata</i>	2.28	2.46	0.12	4.86
<i>Randia</i> sp.	2.66	1.64	0.52	4.82

<i>Michelia hedyosperma</i>	1.14	1.64	1.93	4.71
<i>Drypetes salicifolia</i>	0.76	1.64	2.30	4.70
<i>Hovenia acerba</i> var. <i>kiukiangensis</i>	0.76	0.82	2.82	4.40
<i>Lithocarpus hancei</i>	0.76	0.82	2.56	4.14
<i>Litsea verticillata</i>	1.52	1.64	0.03	3.19
<i>Mastixia pentandra</i> var. <i>chinensis</i>	1.14	1.64	0.28	3.06
<i>Reevesia thyrsoidea</i>	1.14	1.64	0.26	3.04
<i>Randia wallichii</i>	1.14	1.64	0.25	3.03
<i>Dimocarpus yunnanensis</i>	0.76	1.64	0.45	2.85
<i>Macaranga henryi</i>	1.52	0.82	0.17	2.51
<i>Machilus shweliensis</i>	0.38	0.82	1.27	2.47
<i>Alseodaphne andersonii</i>	0.38	0.82	0.91	2.11
<i>Litsea lancifolia</i>	0.76	0.82	0.39	1.97
<i>Walsura yunnanensis</i>	0.38	0.82	0.73	1.93
<i>Cinnamomum tamala</i>	0.76	0.82	0.27	1.85
<i>Elaeocarpus glabripetalus</i> var. <i>alata</i>	0.38	0.82	0.61	1.81
<i>Rhododendron moulmainsensis</i>	0.76	0.82	0.22	1.80
<i>Alsophila costularis</i>	0.76	0.82	0.18	1.76
<i>Beilschmiedia roxburghiana</i>	0.38	0.82	0.45	1.65
<i>Alphonsea tsangyuanensis</i>	0.38	0.82	0.43	1.63
<i>Cyclobalanopsis chrysocalyx</i>	0.38	0.82	0.38	1.58
<i>Meliosma simplicifolia</i>	0.38	0.82	0.33	1.53
<i>Tapiscia yunnanensis</i>	0.38	0.82	0.28	1.48
<i>Alseodaphne pectolaris</i>	0.38	0.82	0.27	1.47
<i>Eriobotrya bengalensis</i> var. <i>angustifolia</i>	0.38	0.82	0.27	1.47
<i>Gymnanthes remota</i>	0.38	0.82	0.26	1.46
<i>Michelia floribunda</i>	0.38	0.82	0.19	1.39
<i>Diospyros kaki</i> var. <i>sylvestris</i>	0.38	0.82	0.18	1.38
<i>Laurocerasus jenkinsii</i>	0.38	0.82	0.15	1.35
<i>Nyssa wenshanensis</i>	0.38	0.82	0.14	1.34
<i>Beilschmiedia linocieroidea</i>	0.38	0.82	0.12	1.31
<i>Ficus auriculata</i>	0.38	0.82	0.09	1.29
<i>Walsura robusta</i>	0.38	0.82	0.08	1.28
<i>Artocarpus nitidus</i>	0.38	0.82	0.08	1.28

<i>Lithocarpus pseudoreinwardtii</i>	0.38	0.82	0.04	1.24
<i>Lindera latifolia</i>	0.38	0.82	0.03	1.23
<i>Oxyspora vagans</i>	0.38	0.82	0.03	1.23
<i>Litsea garretii</i>	0.38	0.82	0.02	1.22
<i>Castanopsis argyrophylla</i>	0.38	0.82	0.01	1.21
<i>Microtropis tetragona</i>	0.38	0.82	0.00	1.20
<i>Gymnosphaera gigantea</i>	0.38	0.82	0.00	1.20
Total (62 species) 263 stems	100	100	100.00	300.00

* RA: Relative abundance; RD: Relative dominance; RF: Relative frequency; IVI: Importance value index (Curtis & McIntosh, 1951)

Appended Table 2. Importance values Index (IVI) of tree species in *Parakmeria yunnanensis*- *Gymnanthes remota* forest.

Altitude: 1650-1700 m	Height of canopy: (m)			
Plot number and size: 5 (25×20) = 2500 m ²	Coverage: > 90%			
Slope degree: 5-30	No. of sp. (>5 cm dbh): 70			
	No. of stems: 293			
Species name	RA	RF	RD	IVI*
<i>Gymnanthes remota</i>	15.36	4.20	3.97	23.53
<i>Parakmeria yunnanensis</i>	1.02	2.52	11.08	14.62
<i>Xanthophyllum yunnanensis</i>	7.17	3.36	2.22	12.75
<i>Syzygium brachythyrsum</i>	7.17	3.36	1.65	12.18
<i>Wendlandia pingpiensis</i>	6.83	3.36	1.19	11.38
<i>Nyssa wenshanensis</i>	1.02	1.68	8.13	10.84
<i>Cinnamomum javanicum</i>	3.07	3.36	3.83	10.26
<i>Calophyllum polyanthum</i>	3.41	3.36	3.38	10.15
<i>Nyssa wenshanensis</i> var. <i>longipedunculata</i>	2.05	1.68	5.93	9.66
<i>Mastixia pentandra</i> subsp. <i>chinensis</i>	4.10	1.68	3.72	9.49
<i>Cyclobalanopsis chapensis</i>	3.42	2.52	3.29	9.23
<i>Manglietia insignis</i>	0.68	0.84	6.17	7.70
<i>Acer decandrum</i>	2.05	3.36	2.26	7.67
<i>Ostodes kuangii</i>	4.44	0.84	0.53	5.80
<i>Cyclobalanopsis chrysocalyx</i>	0.34	0.84	3.97	5.16
<i>Machilus shweliensis</i>	1.37	2.52	1.11	5.00

<i>Engelhardtia spicata</i>	0.34	0.84	3.78	4.96
<i>Alcimandra cathcartii</i>	0.68	1.68	2.58	4.94
<i>Michelia floribunda</i>	1.37	1.68	1.79	4.83
<i>Podocarpus neriifolius</i>	0.68	0.84	3.22	4.75
<i>Craibiodendron stellatum</i>	1.02	0.84	2.55	4.42
<i>Lithocarpus gagnepainianus</i>	1.71	0.84	1.85	4.40
<i>Dimocarpus yunnanensis</i>	2.05	1.68	0.55	4.28
<i>Gomphandra tetrandra</i>	2.73	0.84	0.69	4.26
<i>Cinnamomum bejolghota</i>	1.37	2.52	0.28	4.17
<i>Lithocarpus pseudoreinwardtii</i>	2.05	1.68	0.24	3.96
<i>Linociera ramiflora</i>	0.68	1.68	1.16	3.52
<i>Castanopsis hystrix</i>	0.34	0.84	2.24	3.43
<i>Litsea lancifolia</i>	0.34	0.84	2.21	3.39
<i>Lindera metcalfiana</i> var. <i>dictyophylla</i>	1.37	1.68	0.23	3.27
<i>Castanopsis argyrophylla</i>	0.68	0.84	1.47	2.99
<i>Lithocarpus fohaiensis</i>	0.34	1.68	0.90	2.92
<i>Reevesia thyrsoides</i>	0.68	1.68	0.52	2.88
<i>Ardisia thyrsoiflora</i>	1.02	1.68	0.15	2.86
<i>Randia griffithii</i>	0.68	1.68	0.47	2.84
<i>Schima wallichii</i>	0.68	0.84	1.27	2.80
<i>Symplocos wikstroemiifolia</i>	1.02	1.68	0.07	2.77
<i>Dysoxylum binectariferum</i>	1.02	1.68	0.06	2.76
<i>Pygeum henryi</i>	0.68	1.68	0.33	2.69
<i>Litsea euosma</i>	0.34	0.84	1.26	2.44
<i>Cylindrokelupha kerrii</i>	0.68	1.68	0.06	2.43
<i>Eurya aurea</i>	0.68	1.68	0.06	2.42
<i>Linociera insignis</i>	0.68	1.68	0.04	2.40
<i>Eriobotrya obovata</i>	0.68	0.84	0.84	2.37
<i>Rhododendron moulmainensis</i>	1.02	0.84	0.44	2.30
<i>Acer huianum</i>	0.34	0.84	1.03	2.21
<i>Alangium chinensis</i>	0.34	0.84	0.92	2.10
<i>Elaeocarpus howii</i>	0.34	0.84	0.77	1.95
<i>Machilus rufipes</i>	0.34	0.84	0.61	1.79
<i>Ternstroemia gymnanthera</i>	0.34	0.84	0.54	1.72

<i>Itea macrophylla</i>	0.68	0.84	0.16	1.68
<i>Beilschmiedia robusta</i>	0.34	0.84	0.39	1.57
<i>Lithocarpus truncatus</i>	0.34	0.84	0.38	1.56
<i>Pittosporum kerrii</i>	0.34	0.84	0.26	1.45
<i>Laurocerasus jenkinsii</i>	0.34	0.84	0.23	1.41
<i>Helicia tsaii</i>	0.34	0.84	0.17	1.35
<i>Tricalysia fruticosa</i>	0.34	0.84	0.17	1.35
<i>Styrax grandiflora</i>	0.34	0.84	0.16	1.34
<i>Bruinsmia polysperma</i>	0.34	0.84	0.15	1.33
<i>Garcinia cowa</i>	0.34	0.84	0.08	1.27
<i>Eurya prunifolia</i>	0.34	0.84	0.06	1.24
<i>Casearia velutina</i>	0.34	0.84	0.04	1.22
<i>Carallia lanceaefolia</i>	0.34	0.84	0.03	1.21
<i>Sarcosperma griffithii</i>	0.34	0.84	0.02	1.20
<i>Oxyspora vagans</i>	0.34	0.84	0.02	1.20
<i>Platea latifolia</i>	0.34	0.84	0.02	1.20
<i>Cyclobalanopsis myrsinaefolia</i>	0.34	0.84	0.01	1.20
<i>Amoora yunnanensis</i>	0.34	0.84	0.01	1.19
<i>Paramichelia baillonii</i>	0.34	0.84	0.01	1.19
<i>Anneslea fragrans</i>	0.34	0.84	0.01	1.19
Total (70 species) 293 stems	100.00	100.00	100.00	300.00

* See Appended Table 1.

The shrub layer is 1-5 m high with a cover of 30%-40%, and is dominated by juvenile trees. Frequent shrub species are *Euodia lepta*, *Fargesia plurisetosa*, *Lasianthus lucidus*, *Psychotria symplocifolia*, *Oxyspora vagans* and *Lasianthus inodorus*.

The herbaceous layer is usually less developed than in the preceding forest type. Frequent species are *Davallia mairesii*, *Pteris insignis*, *Ophiopogon graminifolia*, *Colysis pothifolia* and *Strobilanthes* sp.

Lianas are fewer but there are some big woody lianas such as *Connarus paniculatus*, *Celastrus monospermum*, *Epigeum auritum*, *Bousigonia angustifolia*, *Gnetum montanum* and *Alyxia balansae*.

Epiphytes are fewer than in the ME-PM forests.

We have analyzed the forest physiognomy based on 261 vascular species from the 10 plots of these two montane rain forest types. Both forests are dominated by phanerophytes, which make up 79.3% of all species (**Table 1**). In terms of the spectrum of leaf sizes, the plants with mesophyllous leaves contribute up to 68.2% of the total species, and 76.4% of tree species (**Table 2**). Woody plants with simple leaves contribute up to 90.6% and those with entire leaf margins, up to 76.5% (**Table 3**).

The flora

623 native seed plant species (including varieties) in 327 genera and 115 families of seed plants were recorded from the montane rain forest (see Appendix 3). The families with highest species richness included Lauraceae (51 species), Euphorbiaceae (36), Rubiaceae (23), Fagaceae (20), Liliaceae (20), Rosaceae (19), Araceae (18), Theaceae (17) and

Table 1. Life form spectrum of the tropical montane rain forest in southern Yunnan.

	Life form*	Number of species	%
Trees	Megaphanerophyte	12	4.6
	Mesophanerophyte	61	23.4
	Microphanerophyte	54	20.7
	(All trees)	(127)	(48.7)
Shrubs	Nanophanerophyte	22	8.4
Herbaceous plants	Herbaceous phanerophyte	24	9.2
	Geophyte	5	1.9
	Chamaephyte	25	9.6
	(All herbs)	(54)	(20.7)
Liana	Liana phanerophyte	34	13.0
Epiphyte	Epiphyte	24	9.2
Total species		261	100

* The Raunkiaer's criteria (1934) as revised by Mueller-Dombois and Ellenberg (1974): Megaphanerophyte (perennials, over 30 m high); Mesophanerophyte (perennials, 8 to 30 m high); Microphanerophyte (perennials, 2 to 8 m high); Nanophanerophyte (perennials, 0.25 to 2 m

high); Herbaceous phanerophyte (herbaceous perennials, over 0.25 m high); Chamaephytes (perennials, less than 0.25 m high above ground); Geophyte (perennials, dying back above ground).

Table 2. Leaf sizes of the tropical montane rain forest in southern Yunnan.

		Macrophyll 18226-164025 mm ²	Mesophyll 2026-18225 mm ²	Microphyll ² 226-2025 mm ²	Total
Trees	Number of species	1	97	29	127
	%	0.8	76.4	22.8	
Shrubs	Number of species	—	9	13	22
	%	—	40.8	59.1	
Herbs	Number of species	9	32	13	54
	%	16.7	59.2	24.1	
Lianas	Number of species	1	28	5	34
	%	3.0	82.4	14.7	
Epiphytes	Number of species	4	12	8	24
	%	16.7	50.0	33.3	
Total species	Number of species	15	198	48	261
	%	5.7	68.2	26.1	

Table 3. Leaf types, leaf textures and leaf margins of the tropical montane rain forest in southern Yunnan.

		Leaf type		Leaf texture		Leaf margin		
		S	C	P	L	E	N	
Trees	Number of species	113	14	51	76	97	30	127
	%	89.0	11.0	40.2	59.8	76.4	23.6	
Shrubs	Number of species	21	1	17	5	17	5	22
	%	95.4	4.6	77.3	22.7	77.3	22.7	
All woody plants species	Number of species	134	15	68	81	114	35	149
	%	90.6	9.4	45.6	54.4	76.5	23.5	

S: Simple; C: Compound; P: Papery; L: Leathery; E: Entire; N: non-entire.

Papilionaceae (16).

The various types of geographic distributions of seed plants from China at the generic level have been documented by Z.Y. Wu (1991). Using Wu's documentation, we have quantified the distribution types of the flora of montane forest at the generic level and these are summarized in Table 4.

Distribution described as 'tropical Asian', such as *Mastixia*, *Pterospermum* and *Knema*, represent up to 27.5% of total genera of the flora. 'Pantropic' distribution, such as those of *Gnetum*, *Piper*, *Lasianthus* and *Bauhinia*, contribute up to 26 %. 'Old World Tropical' distribution, such as those of *Thunbergia*, *Pandanus* and *Carallia* are the next most abundant. These tropical distributions (Types 2-7) compose 78.9% of the total genera. This indicates that the flora of the montane rain forest in southern Yunnan is of tropical nature and has strong tropical Asiatic affinity.

At the specific level, nine geographical elements (distribution types) were recognized from 623 seed plant species of the montane forest (see Table 4). 'Tropical Asian' elements and their subtypes contribute up to 63.7% of the total sum of species, including those of 'Indo-Malesian' distribution, such as *Garcinia cowa*, *Knema furfuracea* and *Girardinia subaequalis*. Others belong to 'Southern Asian' to 'Mainland Southeast Asian' distributions, such as *Alcimandra cathcartii* and *Silvianthus bracteatus*; and those of 'Mainland SE Asia' to 'SW and SE China' distributions, such as *Vaccinium exaristatum*, *Metadina trichotoma* and *Semecarpus reticulata*. The elements of 'Chinese Endemics' and subtypes, which were defined on available references, contribute up to 26%, including those of 'SW to SE China' distribution, such as *Lithocarpus fordianus* and *Craspedolobium schochii*; and the 'Yunnan Endemics', such as *Lithocarpus fohaiensis* and *Cryptocarya rolletii*.

Comparison with the lowland rain forest in southern Yunnan and the equatorial tropical and montane rain forests in SE Asia

Compared with the tropical montane rain forest in Java at similar altitude (Meijer, 1959), the montane rain forest in southern Yunnan has fewer epiphytes (**Figure 2**), but a higher proportion of woody phanerophytes.

Compared with the tropical seasonal rain forests at lower altitude in southern Yunnan (Zhu et al., 1998a) and equatorial lowland rain forests (Beard, 1946; Pajmans, 1970; Givnish, 1978; Proctor et al., 1998), the

montane rain forest has fewer mega-and meso-phanerophytes and lianas, fewer plants with compound leaves, fewer plants with macrophyllous leaves, but more abundant herbaceous plants and more plants with non-entire leaf margins (**Figures 3 and 4**).

The families with highest species richness in the montane rain forest are, to some extent, similar to those in the seasonal rain forests at lower altitudes in the region, but there is greater species richness in Fagaceae, Theaceae, Liliaceae, Rosaceae and Magnoliaceae (**Figure 5**). In terms of phytosociological importance, most of the dominant families in the montane forest are also dominant families in the lowland seasonal rain forests, but Magnoliaceae, Fagaceae, Mastixiaceae, Nyssaceae and Polygalaceae are of greater importance (**Figure 6**).

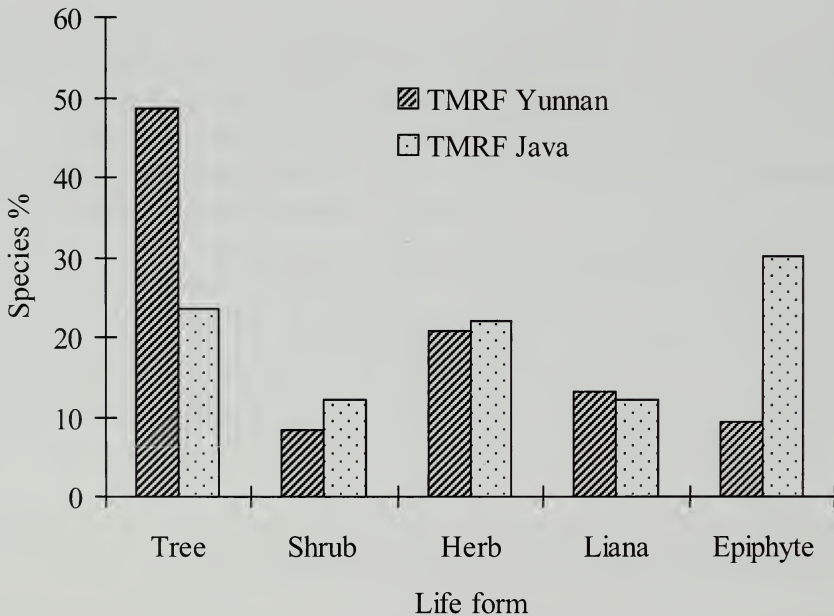


Figure 2. Comparison of life form spectra between the tropical montane rain forest of Mengsong in southern Yunnan and the tropical montane rain forest in Java, Indonesia. TMRF Java: montane rain forest at altitudes 1450-1500 m in Java (Meijer, 1959); TMRF Yunnan: tropical montane rain forest at altitudes 1500-1800 m in Mengsong, southern Yunnan.

Table 4. Geographical elements at generic and specific levels of the flora of the montane rain forest in Mengsong, southern Yunnan.

Distribution types at generic level		No. of genera	%	Distribution type at specific level		No. of species	%
1. Cosmopolitan		10	3.1	1. Cosmopolitan		12	1.9
2. Pantropics		85	26.0	2. Pantropics		7	1.1
3. Tropical Asia & Tropical America disjunct		13	4.0	3. Tropical Asia & Tropical America disjunct		2	0.3
4. Old World Tropics		30	9.2	4. Old World Tropics		4	0.6
5. Tropical Asia to Tropical Australia		16	4.9	5. Tropical Asia to Tropical Australia		10	1.6
6. Tropical Asia to Tropical Africa		24	7.3	6. Tropical Asia to Tropical Africa		11	1.8
7. Tropical Asia (Indo-Malaysia)		90	27.5	7. Tropical Asia and its subtypes		(397)	(63.7)
8. North Temperate		25	7.6	7-1. Indo-Malesia		120	19.3
9. E. Asia and N. America disjunct		12	3.7	7-2. S Asia to Mainland SE Asia		130	20.9
10. Old World Temperate		2	0.6	7-3. Mainland SE Asia to SW and SE China		147	23.6
11. Mediterranean and W. Asia to C. Asia		2	0.6	8. Eastern Asia		18	2.9
14. E. Asia		14	4.3	9. Endemic to China and its subtypes		(162)	(26)
15. Endemic to China		4	1.2	9-1. SW to SE China		91	14.6
Total genera		327	100.0	9-2. Endemic to Yunnan		71	11.4
				Total species		623	100.0

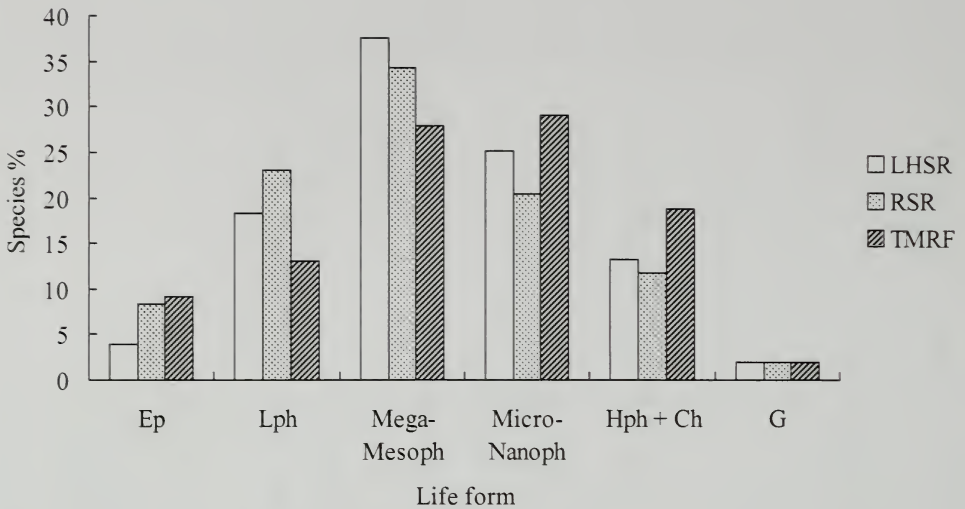


Figure 3. Comparison of life form spectra between the tropical montane rain forest in Mengsong and seasonal rain forests in southern Yunnan.

LHSR: lower hill seasonal rain forest;

RSR: ravine seasonal rain forest;

TMRF: tropical montane rain forest in Mengsong.

Ep=Epiphyte; Ch=Chamaephyte; G=Geophyte; Lph=Liana-phanerophyte

Hph=Herbaceous phanerophyte; Mega-Mesoph=Megaphanerophyte + Mesophanerophyte;

Micro-Nanoph=Microphanerophyte + Nanophanerophyte

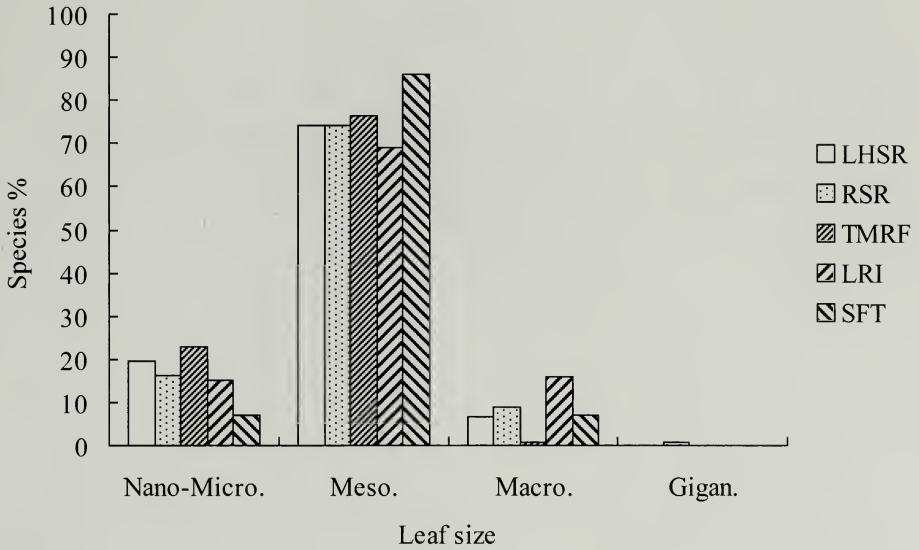


Figure 4. Comparison of leaf size spectra between the tropical montane rain forest in Mengsong and the seasonal rain forests in southern Yunnan, as well as the ones from the equatorial lowland.

LHSR: lower hill seasonal rain forest in southern Yunnan;

RSR: ravine seasonal rain forest in southern Yunnan;

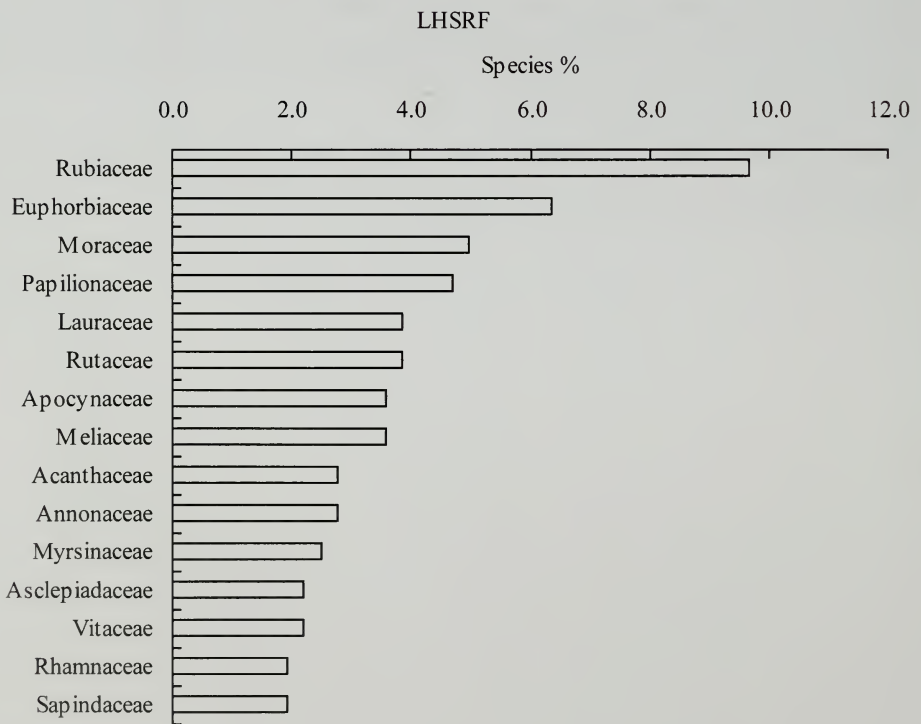
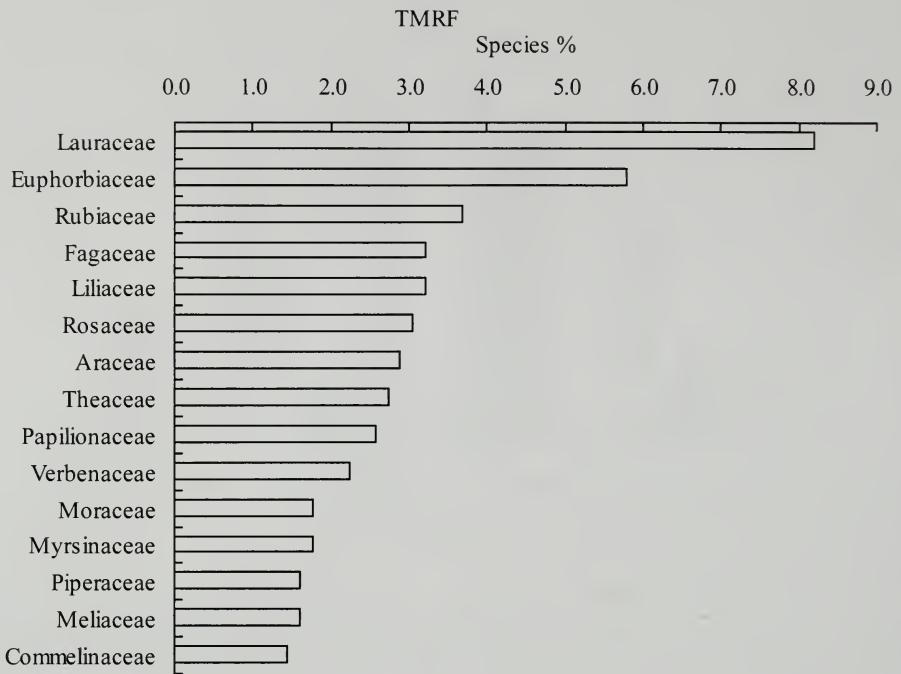
TMRF: tropical montane rain forest in southern Yunnan;

LRI: lowland tropical evergreen rain forest in India²

SFT: evergreen tropical seasonal forest in Trinidad¹

Nano-Micro.: Nanophyll + Microphyll; Meso.: Mesophyll; Macro.: Macrophyll; Gigan.: Gigantophyll

¹ from Beard (1946); ² from Proctor et al. (1998)



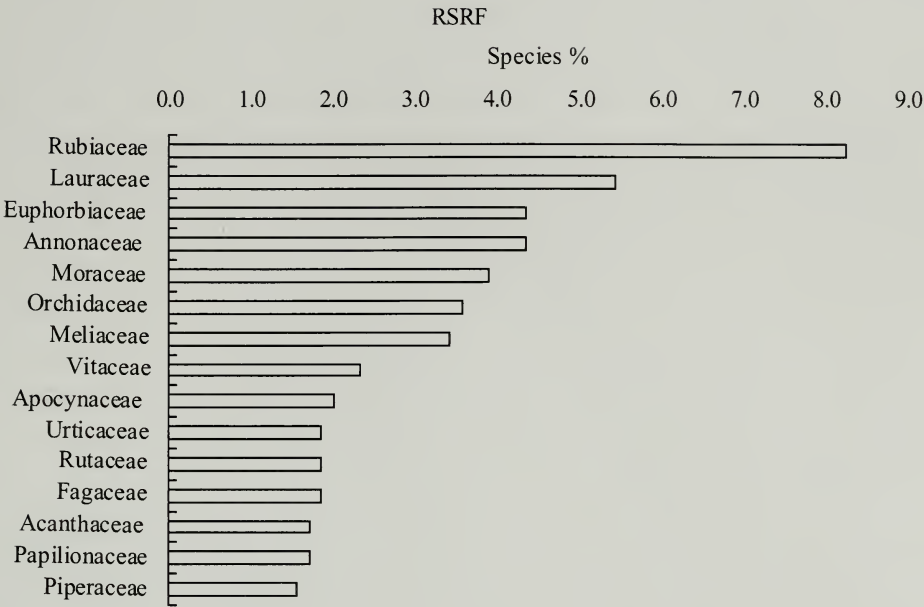
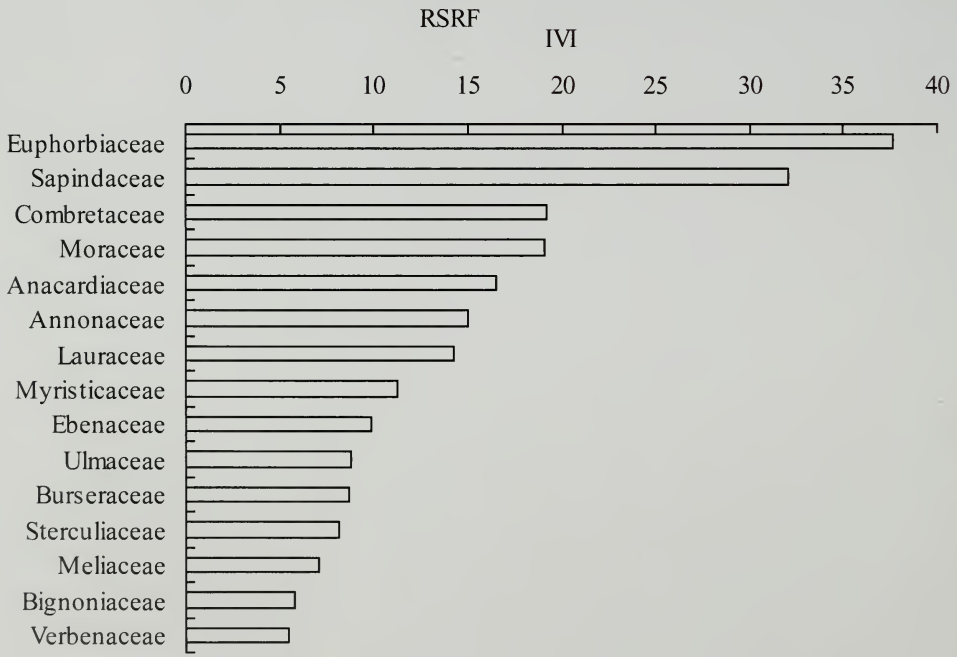
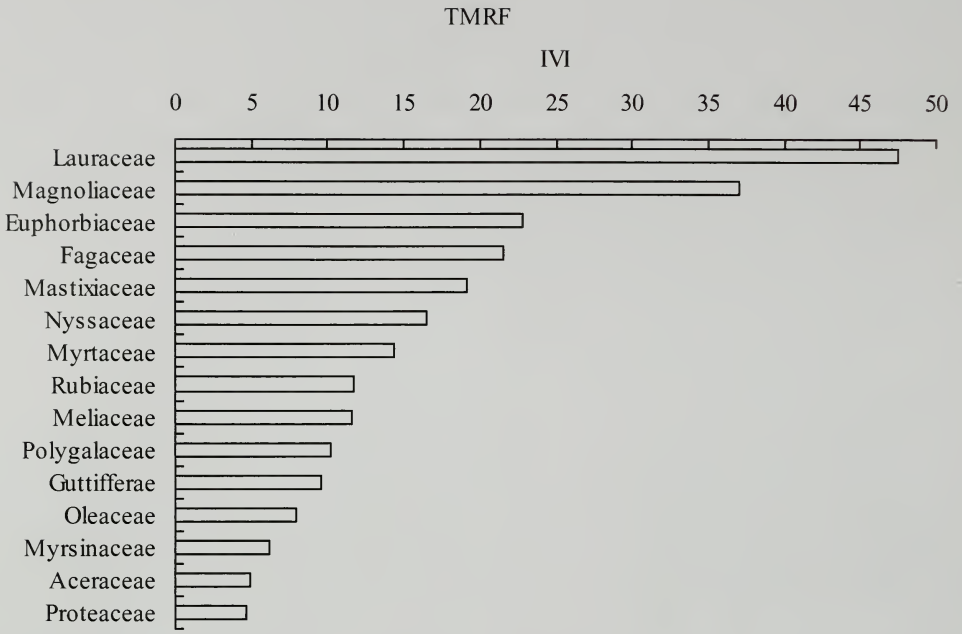


Figure 5. Comparison of abundant families with most species richness between the montane rain forest and seasonal rain forests at lower altitudes in the region.
TMRF: tropical montane rain forest in southern Yunnan;
LHSR: lower hill seasonal rain forest in southern Yunnan;
RSR: ravine seasonal rain forest in southern Yunnan.



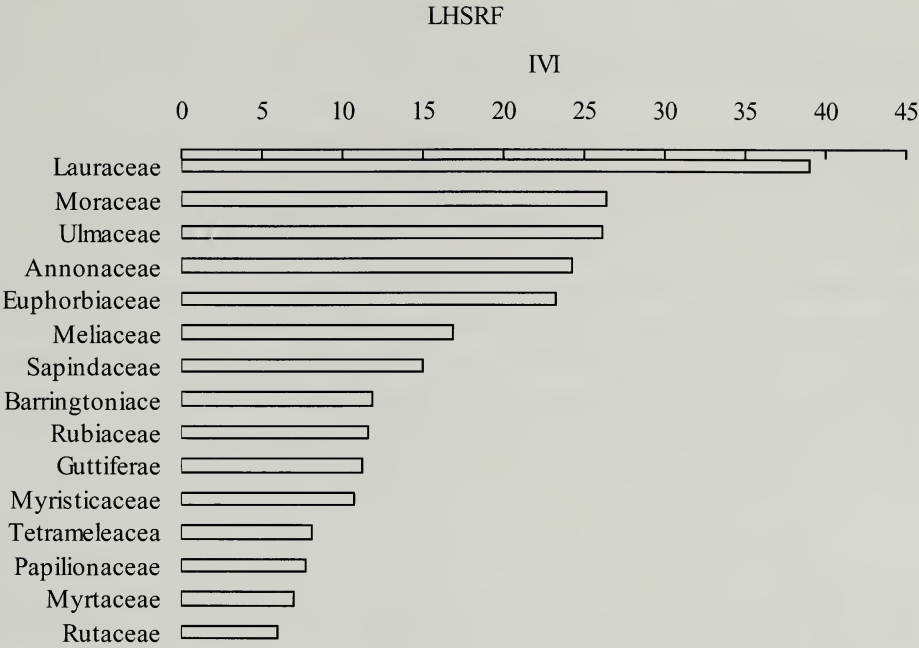


Figure 6. Comparison of families with the highest phytosociological importance between the montane rain forest and seasonal rain forests at lower altitudes in the region.
TMRF: tropical montane rain forest in southern Yunnan;
LHSR: lower hill seasonal rain forest in southern Yunnan;
RSR: ravine seasonal rain forest in southern Yunnan.

Discussion

Altitudinal zonation of tropical forest

Montane vegetation zones in tropical America have been classified by Beard (1944, 1955) into rain forest, lower montane rain forest, montane rain forest, montane thicket and elfin woodland, with increasing altitude. Similarly, Richards (1952) used the terms tropical rain forest, submontane rain forest and montane rain forest for the vegetation zonation in tropical mountains. In contrast, Grubb *et al.* (1963), Whitmore (1984, 1990) and Ashton (2003) prefer the terms of lowland rain forest, lower montane rain forest and upper montane rain forest. The tropical montane rain forest in southern Yunnan occurs at an altitude comparable with lower montane rain forest zone as defined by Grubb *et al.* (1963), Whitmore (1984, 1990) and Ashton (2003).

Equatorial lower montane rain forests are 15–33 m tall and have two tree strata, few emergent trees, few trees with buttresses and cauliflory, few big woody lianas, and fewer plants with pinnate leaves. Plants with mesophyll (Grubb *et al.*, 1963; Whitmore, 1984, 1990) or notophyll leaves (Ashton, 2003) are dominant among the woody plants, and there are abundant vascular epiphytes. Floristic zonation of forests in tropical mountains has been discussed by Ashton (2003), who stresses the laurel-oak attributes of the floras of lower montane rain forests in SE Asia.

The montane rain forest in southern Yunnan is similar to equatorial lower montane rain forests in SE Asia in physiognomy, but differs in having fewer epiphytes and more tree species with pinnate leaves (which contribute up to 11% of the sum of tree species).

The montane rain forest is dominated, in terms of species richness, by the families Lauraceae, Euphorbiaceae, Fagaceae, Rubiaceae, Papilionaceae and Theaceae. In terms of phytosociological importance the dominant families are Lauraceae, Magnoliaceae, Euphorbiaceae, Fagaceae, Mastixiaceae and Nyssaceae. The laurel-oak floristic attribute of the montane forest is overshadowed by some dominant families, such as Euphorbiaceae, Rubiaceae and Magnoliaceae, which are more commonly associated with lowland rain forests.

These differences may be due to the monsoonal climate (seasonal dryness) in southern Yunnan and the so-called “Massenerhebung”, or ‘mass elevation effect’ (Whitmore, 1990). This may reflect the fact that these montane forests in Yunnan have characteristics more usually associated

with lowland sites. The montane rain forests in Yunnan may represent a transition between lowland and lower montane forest in physiognomy and floristics, but appears closer to lower montane rain forest.

The physiognomic changes observed with increasing altitudes in southern Yunnan are similar to those in tropical America (Grubb *et al.*, 1963). Microphyllous leaves increased with increasing altitudes.

Tropical montane rain forests in Yunnan were generally classified into a subtype of tropical rain forest by Wu (1987) based on their floristic composition and physiognomy. They are most similar to the lower montane rain forest in equatorial Asia, which was included under the category of tropical rain forest by Whitmore (1990). We agree with Wu and Whitmore's classification that the montane rain forest in southern Yunnan is a type of lower montane rain forest within the broader category of tropical rain forest.

Biogeographical affinity

Floristically, the montane rain forest in southern Yunnan has strong tropical Asian affinities even though it occurs at the northern margin of mainland of Southeast Asia and at a high altitude. The tropical elements contribute about 78.9% at the generic level and more than 80 % at the specific level of its total flora. Elements with 'tropical Asian' affinities contribute 63.7% of the total sum of species.

Some species of particular biogeographical importance were encountered in these tropical montane rain forests in Yunnan. *Mastixia euonymoides* is a dominant and the biggest tree in the montane rain forest. This species occurs only in the limited border area between Myanmar, Yunnan and Thailand, but it was widely distributed in European and America Tertiary flora, which has even been called the Mastixioidean European Flora (Mai, 1993; Eyde *et al.*, 1990; Tiffney *et al.*, 1996). Its vicarious species, *Mastixia octandra*, occurs in mountains of central Sumatra in Indonesia (Matthew, 1976) at similar altitude (1700-1800 m alt.).

Gymnanthes remota (Euphorbiaceae), a relic and dominant species in the lower tree layer of the montane rain forest, occurs disjunctively in Mengsong in southern Yunnan and in Sumatra (Zhu *et al.*, 2000). The frequent shrub species, *Lasianthus inodorus* (Rubiaceae), which is distributed in mainland SE Asia and Sumatra, as well as Java, also occurs vicariously on Mt Kinabalu

in Borneo (Zhu, 2001). It is interesting that many taxa in the montane rain forest in southern Yunnan have their vicarious species in Malesian montane forests, suggesting a special biogeographical significance for the region. Further floristic and biogeographical studies on the pristine montane rain forest in southern Yunnan are needed.

Acknowledgments

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Appendix 3. Species checklist of the montane rain forest in Mengsong, southern Yunnan.

ACANTHACEAE	<i>Lepidagathis incurva</i> Buch.-Ham. ex D. Don
ACANTHACEAE	<i>Mananthes patentiflora</i> ((Hemsl.) Bremek.
ACANTHACEAE	<i>Phaulopsis imbricata</i> (Forssk.) Sweet
ACANTHACEAE	<i>Phlogacanthus curviflorus</i> (Wall.) Nees
ACANTHACEAE	<i>Pseuderanthemum malaccense</i> (C.B. Clarke) Lindau
ACANTHACEAE	<i>Pteracanthus alatus</i> (Wall.) Bremek.
ACANTHACEAE	<i>Rhaphidosperma vagabunda</i> (R.Ben)C.Y.Wu ex Y.C.Tang
ACANTHACEAE	<i>Rungia pectinata</i> (L.)Nees
ACERACEAE	<i>Acer decandrum</i> Merr.
ACERACEAE	<i>Acer huianum</i> W.P. Fang & C.K. Hsieh
ACERACEAE	<i>Acer jingdongense</i> T.Z. Hsu
ALANGIACEAE	<i>Alangium barbatum</i> (R. Br.) Baill.
ALANGIACEAE	<i>Alangium chinense</i> (Lour.) Harms
ALANGIACEAE	<i>Alangium kurzii</i> Craib
ALISMATACEAE	<i>Sagittaria trifolia</i> L.
AMARANTHACEAE	<i>Achyranthes bidentata</i> Blume
AMARANTHACEAE	<i>Aerva sanguinolenta</i> (L.) Blume
AMARYLLIDACEAE	<i>Allium hookeri</i> Thwaites
ANACARDIACEAE	<i>Choerospondias axillaris</i> (Roxb.) B.L. Burtt & A.W. Hill
ANACARDIACEAE	<i>Pegia nitida</i> Colobr.
ANACARDIACEAE	<i>Rhus chinensis</i> Mill.
ANACARDIACEAE	<i>Semecarpus reticulata</i> Lecomte
ANACARDIACEAE	<i>Spondias lakonensis</i> var. <i>hirsuta</i> C.Y. Wu & T.L. Ming
ANACARDIACEAE	<i>Toxicodendron acuminatum</i> (DC.) C. Y. Wu. T. L. Ming

ANACARDIACEAE	<i>Toxicodendron succedaneum</i> (L.) Kuntze
ANNONACEAE	<i>Alphonsea boniana</i> Finet & Gagnep.
ANNONACEAE	<i>Alphonsea monogyna</i> Merr. & Chun
ANNONACEAE	<i>Alphonsea squamosa</i> Finet & Gagnep.
ANNONACEAE	<i>Alphonsea tsangyuanensis</i> P.T. Li
ANNONACEAE	<i>Fissistigma acuminatissimum</i> Merr.
ANNONACEAE	<i>Fissistigma maclurei</i> Merr.
ANNONACEAE	<i>Fissistigma polyanthum</i> (Hook. f. & Thomson) Merr.
ANNONACEAE	<i>Mitrephora maingayi</i> Hook. f. & Thomson
APOCYNACEAE	<i>Alstonia rostrata</i> C.E.C. Fisch.
APOCYNACEAE	<i>Bousignonia angustifolia</i> Pierre
APOCYNACEAE	<i>Epigynum auritum</i> (C.K. Schneid.) Tsiang & P.T. Li
APOCYNACEAE	<i>Tabernaemontana corymbosa</i> Roxb. ex Wall.
APOSTASIACEAE	<i>Apostasia odorata</i> Blume
AQUIFOLIACEAE	<i>Ilex polyneura</i> (Hand.-Mazz.) S.Y. Hu
AQUIFOLIACEAE	<i>Ilex tetramera</i> var. <i>glabra</i> (C.Y. Wu) T.R. Dudley
ARACEAE	<i>Alocasia macrorrhizos</i> (L.) Schott
ARACEAE	<i>Amorphophallus bannanensis</i> H. Li
ARACEAE	<i>Amorphophallus rivieri</i> Durieu ex Carrière
ARACEAE	<i>Amorphophallus ximengensis</i> H. Li
ARACEAE	<i>Arisaema austroyunnanense</i> H. Li
ARACEAE	<i>Arisaema inkiangense</i> H. Li
ARACEAE	<i>Colocasia esculenta</i> (L.) Schott
ARACEAE	<i>Colocasia gigantea</i> (Blume) Hook. f.
ARACEAE	<i>Gonatanthus pumilus</i> (D. Don) Engl. & K. Krause
ARACEAE	<i>Pothos chinensis</i> (Raf.) Merr.
ARACEAE	<i>Pothos scandens</i> L.

ARACEAE	<i>Remusatia hookeriana</i> Schott
ARACEAE	<i>Remusatia vivipara</i> (Lodd.) Schott
ARACEAE	<i>Rhaphidophora crassicaulis</i> Engl. & K. Krause
ARACEAE	<i>Rhaphidophora decursiva</i> (Roxb.) Schott
ARACEAE	<i>Rhaphidophora hookeri</i> Schott
ARACEAE	<i>Rhaphidophora lancifolia</i> Schott
ARACEAE	<i>Rhaphidophora megaphylla</i> H. Li
ARALIACEAE	<i>Aralia armata</i> (Wall.) Seem.
ARALIACEAE	<i>Brassaiopsis producta</i> (Dunn) C.B. Shang
ARALIACEAE	<i>Macropanax dispermus</i> (Blume) Kuntze
ARALIACEAE	<i>Macropanax undulatus</i> var. <i>simplex</i> H.L. Li
ARALIACEAE	<i>Schefflera chapana</i> Harms
ARALIACEAE	<i>Schefflera octophylla</i> (Lour.) Harms
ARALIACEAE	<i>Tupidanthus calyptratus</i> Hook. & Thomson
ARISTOLOCHIACEAE	<i>Aristolochia cathcartii</i> Hook. f.
ARISTOLOCHIACEAE	<i>Aristolochia fangchi</i> Y.C. Wu ex L.D. Chow & S.M. Hwang
ARISTOLOCHIACEAE	<i>Aristolochia tagala</i> Cham.
ASCLEPIADACEAE	<i>Hoya villosa</i> Costantin
BALANOPHORACEAE	<i>Balanophora harlandii</i> Hook. f.
BALSAMINACEAE	<i>Impatiens balansae</i> Hook. f.
BALSAMINACEAE	<i>Impatiens mengtzeana</i> Hook. f.
BEGONIACEAE	<i>Begonia augustinei</i> Hemsl.
BEGONIACEAE	<i>Begonia crassirostris</i> Irmsch.
BEGONIACEAE	<i>Begonia versicolor</i> Irmsch.
BETULACEAE	<i>Alnus nepalensis</i> D. Don
BETULACEAE	<i>Betula alnoides</i> Buch.-Ham. ex D. Don
BETULACEAE	<i>Betula luminifera</i> H.J.P. Winkl.

BIGNONIACEAE	<i>Mayodendron igneum</i> (Kurz) Kurz
BURSERACEAE	<i>Canarium pimela</i> Leenh.
BURSERACEAE	<i>Canarium strictum</i> Roxb.
BURSERACEAE	<i>Canarium tonkinense</i> (Leenh.) Engl.
CAESALPINIACEAE	<i>Bauhinia variegata</i> L.
CAESALPINIACEAE	<i>Caesalpinia cucullata</i> Roxb.
CAESALPINIACEAE	<i>Cassia agnes</i> (De Wit) Brenen
CAESALPINIACEAE	<i>Gleditsia fera</i> (Lour.) Merr.
CAPPARIDACEAE	<i>Capparis fohaiensis</i> B.S. Sun
CAPRIFOLIACEAE	<i>Viburnum cylindricum</i> Buch.-Ham. ex D. Don
CAPRIFOLIACEAE	<i>Viburnum punctatum</i> Buch.-Ham. ex D. Don
CARLEMANNIACEAE	<i>Silvianthus bracteatus</i> Hook. f.
CELASTRACEAE	<i>Celastrus angulata</i> Maxim.
CELASTRACEAE	<i>Celastrus paniculata</i> subsp. <i>multiflorus</i> (Roxb.) Hou
CELASTRACEAE	<i>Celastrus paniculatus</i> Willd.
CELASTRACEAE	<i>Glyptopetalum sclerocarpum</i> (Kurz) Lawson
CELASTRACEAE	<i>Microtropis discolor</i> (Wallich) Arn.
CELASTRACEAE	<i>Microtropis tetragona</i> Merr. & F.L. Freeman
CHLORANTHACEAE	<i>Sarcandra glabra</i> subsp. <i>brachystachys</i> (Blume) Verdc.
COMMELINACEAE	<i>Amischotolype hispida</i> (Less. & A. Rich.) D.Y. Hong
COMMELINACEAE	<i>Amischotolype hookeri</i> (Hassk.) H. Hara
COMMELINACEAE	<i>Commelina paludosa</i> Blume
COMMELINACEAE	<i>Cyanotis cristata</i> (L.) D. Don
COMMELINACEAE	<i>Cyanotis vaga</i> (Lour.) Roem. & Schult.
COMMELINACEAE	<i>Dictyospermum conspicuum</i> (Blume) Hassk.
COMMELINACEAE	<i>Floscopa scandens</i> Lour.
COMMELINACEAE	<i>Porandra scandens</i> D.Y. Hong

COMMELINACEAE	<i>Rhopalephora scaberrima</i> (Blume) Faden
COMPOSITAE	<i>Artemisia argyi</i> H. Lév. & Vaniot
COMPOSITAE	<i>Dichrocephala benthamii</i> C.B. Clarke
COMPOSITAE	<i>Emilia prenanthoidea</i> DC.
COMPOSITAE	<i>Senecio scandens</i> Buch.-Ham. ex D. Don
COMPOSITAE	<i>Vernonia cinerea</i> (L.) Less.
CONNARACEAE	<i>Connarus paniculatus</i> Roxb.
CORNACEAE	<i>Mastixia euonymoides</i> Prain
CORNACEAE	<i>Mastixia pentandra</i> subsp. <i>chinensis</i> (Merr.) K.M. Matthew
CORYLACEAE	<i>Carpinus londoniana</i> H.J.P. Winkl.
CUCURBITACEAE	<i>Gynostemma laxum</i> (Wall.) Cogn.
CUCURBITACEAE	<i>Gynostemma pentaphyllum</i> (Thunb.) Makino
CUCURBITACEAE	<i>Gynostemma pubescens</i> (Gagnep.) C.Y. Wu
CYPERACEAE	<i>Carex baccans</i> Nees
CYPERACEAE	<i>Mariscus sumatrensis</i> var. <i>subcompositus</i> (C.B. Clarke) S. Karthikeyan
DIOSCOREACEAE	<i>Dioscorea bulbifera</i> L.
DIOSCOREACEAE	<i>Dioscorea chingii</i> Prain & Burkill
DIOSCOREACEAE	<i>Dioscorea esquirolii</i> Prain & Burkill
DIOSCOREACEAE	<i>Dioscorea glabra</i> Roxb.
EBENACEAE	<i>Diospyros kaki</i> var. <i>silvestris</i> Makino
EBENACEAE	<i>Diospyros kerrii</i> Craib
EBENACEAE	<i>Diospyros nigrocortex</i> C.Y. Wu
EBENACEAE	<i>Diospyros yunnanensis</i> Rehder & E.H. Wilson
ELAEAGNACEAE	<i>Elaeagnus conferta</i> var. <i>menghaiensis</i> W.K. Hu & H.F. Chow
ELAEAGNACEAE	<i>Elaeagnus gonyanthes</i> Benth.
ELAEAGNACEAE	<i>Elaeagnus macrantha</i> Rehder
ELAEOCARPACEAE	<i>Elaeocarpus apiculatus</i> Masters in Hook. f.

ELAEOCARPACEAE	<i>Elaeocarpus austroyunnanensis</i> Hu
ELAEOCARPACEAE	<i>Elaeocarpus decipiens</i> Hemsl.
ELAEOCARPACEAE	<i>Elaeocarpus glabripetalus</i> Merr.
ELAEOCARPACEAE	<i>Elaeocarpus glabripetalus</i> var. <i>alatus</i> (Kunth) Hung T. Chang
ELAEOCARPACEAE	<i>Elaeocarpus howii</i> Merr. & Chun
ELAEOCARPACEAE	<i>Elaeocarpus petiolatus</i> (Jack) Wall. ex Kurz
ELAEOCARPACEAE	<i>Sloanea mollis</i> Gagnep.
ELAEOCARPACEAE	<i>Sloanea tomentosa</i> (Benth.) Rehder & E.H. Wilson
ERICACEAE	<i>Craibiodendron stellatum</i> (Pierre) W.W. Sm.
ERICACEAE	<i>Rhododendron moulmainense</i> Hook.
ESCALLONIACEAE	<i>Itea macrophylla</i> Wall.
EUPHORBIACEAE	<i>Antidesma fordii</i> Hemsl.
EUPHORBIACEAE	<i>Antidesma montanum</i> Blume
EUPHORBIACEAE	<i>Aporusa dioica</i> (Roxb.) Müll. Arg.
EUPHORBIACEAE	<i>Aporusa villosa</i> (Lindl.) Baill.
EUPHORBIACEAE	<i>Aporusa yunnanensis</i> (Pax & K. Hoffm.) F.P. Metcalf
EUPHORBIACEAE	<i>Baccaurea ramiflora</i> Lour.
EUPHORBIACEAE	<i>Baliospermum effusum</i> Pax & Hoffm. in Engl.
EUPHORBIACEAE	<i>Baliospermum montanum</i> (Willd.) Müll. Arg.
EUPHORBIACEAE	<i>Bischofia javanica</i> Blume
EUPHORBIACEAE	<i>Breynia fruticosa</i> (L.) Hook. f.
EUPHORBIACEAE	<i>Bridelia tomentosa</i> Blume
EUPHORBIACEAE	<i>Croton caudatus</i> Geiseler
EUPHORBIACEAE	<i>Croton damayeshu</i> Y.T. Chang
EUPHORBIACEAE	<i>Drypetes cumingii</i> (Baill.) Pax & K. Hoffm.
EUPHORBIACEAE	<i>Drypetes salicifolia</i> Gagnep.
EUPHORBIACEAE	<i>Glochidion assamicum</i> (Müll. Arg.) Hook. f.

EUPHORBIACEAE	<i>Glochidion hirsutum</i> (Roxb.) Voigt
EUPHORBIACEAE	<i>Glochidion khasicum</i> (Müll. Arg.) Hook. f.
EUPHORBIACEAE	<i>Glochidion lanceolarium</i> (Roxb.) Voigt
EUPHORBIACEAE	<i>Glochidion puberum</i> (L.) Hutch.
EUPHORBIACEAE	<i>Gymnanthes remota</i> (Steenis) Esser
EUPHORBIACEAE	<i>Macaranga denticulata</i> (Blume) Müll. Arg.
EUPHORBIACEAE	<i>Macaranga henryi</i> (Pax & K. Hoffm.) Rehder
EUPHORBIACEAE	<i>Macaranga indica</i> Wight
EUPHORBIACEAE	<i>Macaranga kurzii</i> (Kuntze) Pax & Hoffm. in Engl.
EUPHORBIACEAE	<i>Mallotus barbatus</i> (Wall.) Müll. Arg.
EUPHORBIACEAE	<i>Mallotus macrostachyus</i> (Miq.) Müll. Arg.
EUPHORBIACEAE	<i>Mallotus paniculatus</i> (Lam.) Müll. Arg.
EUPHORBIACEAE	<i>Mallotus philippinensis</i> (Lam.) Müll. Arg.
EUPHORBIACEAE	<i>Mallotus tetracoccus</i> (Roxb.) Kurz
EUPHORBIACEAE	<i>Ostodes katharinae</i> Pax
EUPHORBIACEAE	<i>Ostodes kuangii</i> Y.T. Chang
EUPHORBIACEAE	<i>Ostodes paniculata</i> Blume
EUPHORBIACEAE	<i>Phyllanthus emblica</i> L.
EUPHORBIACEAE	<i>Sapium baccatum</i> Roxb.
EUPHORBIACEAE	<i>Sapium discolor</i> (Champ. ex Benth.) Müll. Arg.
FAGACEAE	<i>Castanopsis argyrophylla</i> King ex Hook. f.
FAGACEAE	<i>Castanopsis calathiformis</i> (Skan) Rehder & E.H. Wilson
FAGACEAE	<i>Castanopsis carlesii</i> var. <i>spinulosa</i> W.C. Cheng & C.S. Chao
FAGACEAE	<i>Castanopsis ceratacantha</i> Rehder & E.H. Wilson
FAGACEAE	<i>Castanopsis echidnocarpa</i> Hook. f. & Thomson ex Miq.
FAGACEAE	<i>Castanopsis hystrix</i> Miq.
FAGACEAE	<i>Castanopsis indica</i> (Roxburgh ex Lindl.) A. DC.

FAGACEAE	<i>Castanopsis mekongensis</i> A. Camus
FAGACEAE	<i>Castanopsis tcheponensis</i> Hickel & A. Camus
FAGACEAE	<i>Cyclobalanopsis kerrii</i> (Craib) Hu
FAGACEAE	<i>Cyclobalanopsis myrsinifolia</i> (Blume) Oerst.
FAGACEAE	<i>Lithocarpus fohaiensis</i> (Hu) A. Camus
FAGACEAE	<i>Lithocarpus fordianus</i> (Hemsl.) Chun
FAGACEAE	<i>Lithocarpus grandifolius</i> (D. Don) S.N. Biswas
FAGACEAE	<i>Lithocarpus hancei</i> (Benth.) Rehder
FAGACEAE	<i>Lithocarpus hypoglaucus</i> (Hu) C.C. Huang
FAGACEAE	<i>Lithocarpus microspermus</i> A. Camus
FAGACEAE	<i>Lithocarpus pseudoreinwardtii</i> A. Camus
FAGACEAE	<i>Lithocarpus rhabdostachyus</i> subsp. <i>dakhaensis</i> A. Camus
FAGACEAE	<i>Lithocarpus truncatus</i> (King ex Hook. f.) Rehder & E.H. Wilson
FLACOURTIACEAE	<i>Xylosma congesta</i> (Lour.) Merr.
FLACOURTIACEAE	<i>Xylosma longifolia</i> Clos
FUMARIACEAE	<i>Corydalis balansae</i> Prain
GENTIANACEAE	<i>Tripterospermum membranaceum</i> (C. Marquand) Harry Sm.
GESNERIACEAE	<i>Rhynchothecum ellipticum</i> (Wall. ex D. Dietr.) A. DC.
GNETACEAE	<i>Gnetum montanum</i> fo. <i>megalocarpum</i> Markgr.
GNETACEAE	<i>Gnetum montanum</i> Markgr.
GNETACEAE	<i>Gnetum pendulum</i> C.Y. Cheng
GUTTIFERAE	<i>Calophyllum polyanthum</i> Wall. ex Choisy
GUTTIFERAE	<i>Garcinia cowa</i> Roxb.
HAMAMELIDACEAE	<i>Altingia excelsa</i> Noronha
HAMAMELIDACEAE	<i>Distyliopsis yunnanensis</i> (Hung T. Chang) C.Y. Wu
HYDRANGIACEAE	<i>Dichroa febrifuga</i> Lour.
HYPERICACEAE	<i>Cratoxylum cochinchinense</i> (Lour.) Blume

HYPPOCRATEACEAE	<i>Pristimera arborea</i> (Roxb.) A.C. Sm.
ICACINACEAE	<i>Apodytes dimidiata</i> E. Mey. ex Arn.
ICACINACEAE	<i>Gomphandra tetrandra</i> (Wall.) Sleumer
ICACINACEAE	<i>Iodes ovalis</i> Blume
ICACINACEAE	<i>Mappianthus iodoides</i> Hand.-Mazz.
ICACINACEAE	<i>Natsiatopsis thunbergiae</i> folia Kurz
ICACINACEAE	<i>Nothapodytes collina</i> C.Y. Wu
ICACINACEAE	<i>Platea latifolia</i> Blume
JUGLANDACEAE	<i>Engelhardia roxburghiana</i> Wall.
JUGLANDACEAE	<i>Engelhardia serrata</i> Blume
JUGLANDACEAE	<i>Engelhardia spicata</i> Lesch. ex Blume
JUGLANDACEAE	<i>Juglans sigillata</i> Dode
LABIATAE	<i>Gomphostemma arbusculum</i> C.Y. Wu
LABIATAE	<i>Gomphostemma crinitum</i> Wall. ex Benth.
LABIATAE	<i>Gomphostemma stellatohirsutum</i> C.Y. Wu
LABIATAE	<i>Leucosceptrum canum</i> Sm.
LABIATAE	<i>Paraphlomis javanica</i> (Blume) Prain
LABIATAE	<i>Pogostemon glaber</i> Benth.
LARDIZABALACEAE	<i>Stauntonia brunoniana</i> Wall. ex Hemsl.
LAURACEAE	<i>Actinodaphne henryi</i> Gamble
LAURACEAE	<i>Actinodaphne obovata</i> (Nees) Blume
LAURACEAE	<i>Alseodaphne andersonii</i> (King ex Hook. f.) Kosterm.
LAURACEAE	<i>Alseodaphne petiolaris</i> (Meisn.) Hook. f.
LAURACEAE	<i>Beilschmiedia linocieroides</i> H.W. Li
LAURACEAE	<i>Beilschmiedia percoriacea</i> C.K. Allen
LAURACEAE	<i>Beilschmiedia purpurascens</i> H.W. Li
LAURACEAE	<i>Beilschmiedia robusta</i> C.K. Allen

LAURACEAE	<i>Beilschmiedia roxburghiana</i> Nees
LAURACEAE	<i>Beilschmiedia yunnanensis</i> Hu
LAURACEAE	<i>Cassytha filiformis</i> L.
LAURACEAE	<i>Cinnamomum austroyunnanense</i> H.W. Li
LAURACEAE	<i>Cinnamomum bejolghota</i> (Buch.-Ham.) Sweet
LAURACEAE	<i>Cinnamomum glanduliferum</i> (Wall.) Nees
LAURACEAE	<i>Cinnamomum iners</i> Reinw. ex Blume
LAURACEAE	<i>Cinnamomum mollifolium</i> H.W. Li
LAURACEAE	<i>Cinnamomum tamala</i> (Buch.-Ham.) T. Nees & Eberm.
LAURACEAE	<i>Cinnamomum tenuipilis</i> Kosterm.
LAURACEAE	<i>Cryptocarya brachythyrsa</i> H.W. Li
LAURACEAE	<i>Cryptocarya calcicola</i> H.W. Li
LAURACEAE	<i>Cryptocarya densiflora</i> Blume
LAURACEAE	<i>Cryptocarya rolletii</i> H. Wang & H. Zhu
LAURACEAE	<i>Iteadaphne caudata</i> (Nees) H.W. Li
LAURACEAE	<i>Lindera latifolia</i> Hook. f.
LAURACEAE	<i>Lindera menghaiensis</i> H.W. Li
LAURACEAE	<i>Lindera metcalfiana</i> var. <i>dictyophylla</i> (C.K. Allen) H.B. Cui
LAURACEAE	<i>Litsea atrata</i> S.K. Lee
LAURACEAE	<i>Litsea balansae</i> Lecomte
LAURACEAE	<i>Litsea baviensis</i> Lecomte
LAURACEAE	<i>Litsea chinpingensis</i> Yen C. Yang & P.H. Huang
LAURACEAE	<i>Litsea cubeba</i> (Lour.) Pers.
LAURACEAE	<i>Litsea elongata</i> (Nees) Benth. & Hook. f.
LAURACEAE	<i>Litsea euosma</i> W.W. Sm.
LAURACEAE	<i>Litsea garrettii</i> Gamble
LAURACEAE	<i>Litsea glutinosa</i> (Lour.) C.B. Rob.

LAURACEAE	<i>Litsea lancifolia</i> (Roxb. ex Nees in Wall.) Benth. & Hook. f. ex Villar
LAURACEAE	<i>Litsea lancifolia</i> var. <i>ellipsoidea</i> Yen C. Yang & P.H. Huang
LAURACEAE	<i>Litsea lancifolia</i> var. <i>pedicellata</i> Hook. f.
LAURACEAE	<i>Litsea liyuyingi</i> H. Liu
LAURACEAE	<i>Litsea longistaminata</i> (H. Liu) Kosterm.
LAURACEAE	<i>Litsea magnoliifolia</i> Yen C. Yang & P.H. Huang
LAURACEAE	<i>Litsea vang</i> Lecomte var. <i>lobata</i> Lecomte
LAURACEAE	<i>Litsea verticillata</i> Hance
LAURACEAE	<i>Machilus salicina</i> Hance
LAURACEAE	<i>Persea robusta</i> (W.W. Sm.) Kosterm.
LAURACEAE	<i>Persea rufipes</i> (H.W. Li) Kosterm.
LAURACEAE	<i>Persea shweliensis</i> (W.W. Sm.) Kosterm.
LAURACEAE	<i>Phoebe lanceolata</i> (Nees) Nees
LAURACEAE	<i>Phoebe macrocarpa</i> C.Y. Wu
LAURACEAE	<i>Phoebe puwenensis</i> Cheng
LAURACEAE	<i>Phoebe rufescens</i> H.W. Li
LILIACEAE	<i>Asparagus subscandens</i> F.T. Wang & S.C. Chen
LILIACEAE	<i>Aspidistra typica</i> Baill.
LILIACEAE	<i>Campylandra chinensis</i> (Baker) M.N. Tamura, S.Yun Liang & Turland
LILIACEAE	<i>Chlorophytum malayense</i> Ridl.
LILIACEAE	<i>Dianella ensifolia</i> (L.) DC.
LILIACEAE	<i>Disporopsis longifolia</i> Craib
LILIACEAE	<i>Disporum calcaratum</i> D. Don
LILIACEAE	<i>Disporum cantoniense</i> (Lour.) Merr.
LILIACEAE	<i>Liriope graminifolia</i> (L.) Baker
LILIACEAE	<i>Ophiopogon tsaii</i> F.T. Wang & Ts. Tang
LILIACEAE	<i>Peliosanthes sinica</i> F.T. Wang & Ts. Tang

LILIACEAE	<i>Reineckea carnea</i> (Andrews) Kunth
LILIACEAE	<i>Smilax hemsleyana</i> Craib
LILIACEAE	<i>Smilax hypoglauca</i> Benth.
LILIACEAE	<i>Smilax megacarpa</i> A. DC.
LILIACEAE	<i>Smilax myrtillus</i> A. DC.
LILIACEAE	<i>Smilax ocreata</i> A. DC.
LILIACEAE	<i>Smilax perfoliata</i> Lour.
LILIACEAE	<i>Smilax quadrata</i> A. DC.
LILIACEAE	<i>Tupistra grandistigma</i> F.T. Wang & S.Yun Liang
LOGANIACEAE	<i>Buddleja officinalis</i> Maxim.
LYTHRACEAE	<i>Rotala rotundifolia</i> (Buch.-Ham. ex Roxb.) Koehne
MAGNOLIACEAE	<i>Alcimandra cathcartii</i> (Hook. f. & Thomson) Dandy
MAGNOLIACEAE	<i>Manglietia forrestii</i> W.W. Sm.ex Dandy
MAGNOLIACEAE	<i>Manglietia garrettii</i> Craib
MAGNOLIACEAE	<i>Manglietia insignis</i> (Wall.) Blume
MAGNOLIACEAE	<i>Michelia cavaleriei</i> Finet & Gagnep.
MAGNOLIACEAE	<i>Michelia floribunda</i> Finet & Gagnep.
MAGNOLIACEAE	<i>Michelia hedyosperma</i> Y.W. Law
MAGNOLIACEAE	<i>Parakmeria yunnanensis</i> Hu
MAGNOLIACEAE	<i>Paramichelia baillonii</i> (Pierre) Hu
MALVACEAE	<i>Hibiscus indicus</i> (Burm. f.) Hochr.
MALVACEAE	<i>Kydia calycina</i> Roxb.
MALVACEAE	<i>Kydia glabrescens</i> var. <i>intermedia</i> S.Y. Hu
MALVACEAE	<i>Sida szechuensis</i> Matsuda
MALVACEAE	<i>Urena lobata</i> L.
MARANTACEAE	<i>Phrynium placentarium</i> (Lour.) Merr.
MARANTACEAE	<i>Stachyphrynium sinense</i> H. Li

MELASTOMACEAE	<i>Medinilla septentrionalis</i> (W.W. Sm.) H.L. Li
MELASTOMACEAE	<i>Melastoma affine</i> D. Don
MELASTOMACEAE	<i>Melastoma normale</i> D. Don
MELASTOMACEAE	<i>Oxyspora vagans</i> (Roxb.) Wall.
MELIACEAE	<i>Aglaia abbreviata</i> C.Y. Wu
MELIACEAE	<i>Aglaia perviridis</i> Hiern
MELIACEAE	<i>Amoora yunnanensis</i> (H.L. Li) C.Y. Wu
MELIACEAE	<i>Dysoxylum binectariferum</i> (Roxb.) Hook. f. ex Bedd.
MELIACEAE	<i>Dysoxylum lukii</i> Merr.
MELIACEAE	<i>Melia toosendan</i> Siebold & Zucc.
MELIACEAE	<i>Toona ciliata</i> M. Roem.
MELIACEAE	<i>Toona sinensis</i> (Juss.) Roem.
MELIACEAE	<i>Trichilia connaroides</i> (Wight & Arn.) Benth.
MELIACEAE	<i>Walsura yunnanensis</i> C.Y. Wu
MENISPERMACEAE	<i>Cocculus laurifolius</i> DC.
MENISPERMACEAE	<i>Stephania forsteri</i> (DC.) A. Gray
MIMOSACEAE	<i>Albizia bracteata</i> Dunn
MIMOSACEAE	<i>Albizia chinensis</i> (Osbeck) Merr.
MIMOSACEAE	<i>Albizia crassiramea</i> Lace
MIMOSACEAE	<i>Albizia lucidior</i> (Steud.) I.C. Nielsen
MIMOSACEAE	<i>Albizia odoratissima</i> (L. f.) Benth.
MIMOSACEAE	<i>Cylindrokelupha kerrii</i> (Gagnep.) T.L. Wu
MIMOSACEAE	<i>Pithecolobium clypearia</i> Benth.
MORACEAE	<i>Artocarpus lakoocha</i> Wall. ex Roxb.
MORACEAE	<i>Artocarpus nitidus</i> subsp. <i>griffithii</i> (King) F.M. Jarrett
MORACEAE	<i>Artocarpus tonkinensis</i> A. Chev.
MORACEAE	<i>Broussonetia papyrifera</i> (L.) L'Hér. ex Vent.

MORACEAE	<i>Ficus auriculata</i> Lour.
MORACEAE	<i>Ficus cyrtophylla</i> Wall. ex Miq.
MORACEAE	<i>Ficus esquiroliana</i> H. Lév.
MORACEAE	<i>Ficus fistulosa</i> Reinw. ex Blume
MORACEAE	<i>Ficus hookeriana</i> Corner
MORACEAE	<i>Ficus semicordata</i> Buch.-Ham. ex Sm.
MORACEAE	<i>Morus macroura</i> Miq.
MUSACEAE	<i>Musa acuminata</i> Colla
MYRICACEAE	<i>Myrica esculenta</i> Buch.-Ham. ex D. Don
MYRISTICACEAE	<i>Horsfieldia glabra</i> (Reinw. ex Blume) Warb.
MYRISTICACEAE	<i>Horsfieldia tetratapa</i> C.Y. Wu
MYRISTICACEAE	<i>Knema cinerea</i> var. <i>glauca</i> (Blume) Y.H. Li
MYRISTICACEAE	<i>Knema erratica</i> (Hook. f. & Thomson) J. Sincl.
MYRISTICACEAE	<i>Knema furfuracea</i> (Hook. f. & Thomson) Warb.
MYRISTICACEAE	<i>Knema globularia</i> (Lam.) Warb.
MYRSINACEAE	<i>Ardisia corymbifera</i> Mez
MYRSINACEAE	<i>Ardisia depressa</i> C.B. Clarke
MYRSINACEAE	<i>Ardisia thyrsiflora</i> D. Don
MYRSINACEAE	<i>Ardisia villosa</i> Roxb.
MYRSINACEAE	<i>Ardisia virens</i> Kurz
MYRSINACEAE	<i>Embelia laeta</i> (L.) Mez
MYRSINACEAE	<i>Maesa indica</i> (Roxb.) A. DC.
MYRSINACEAE	<i>Maesa macilentoides</i> C. Chen
MYRSINACEAE	<i>Maesa perlaria</i> (Lour.) Merr.
MYRSINACEAE	<i>Maesa permollis</i> Kurz
MYRSINACEAE	<i>Myrsine seguinii</i> H. Lév.
MYRTACEAE	<i>Decaspermum fruticosum</i> J.R. Forst. & G. Forst.

MYRTACEAE	<i>Syzygium brachythyrsum</i> Merr. & L.M. Perry
MYRTACEAE	<i>Syzygium cathayense</i> Merr. & L.M. Perry
MYRTACEAE	<i>Syzygium polypetaloides</i> Merr. & L.M. Perry
MYRTACEAE	<i>Syzygium rockii</i> Merr. & L.M. Perry
MYRTACEAE	<i>Syzygium tetragonum</i> (Wight) Wall. ex Walp.
MYRTACEAE	<i>Syzygium thumra</i> (Roxb.) Merr. & L.M. Perry
MYRTACEAE	<i>Syzygium yunnanense</i> Merr. & L.M. Perry
NYSSACEAE	<i>Nyssa wenshanensis</i> Fang & Soong
NYSSACEAE	<i>Nyssa wenshanensis</i> var. <i>longipedunculata</i> W.P. Fang & Soong
NYSSACEAE	<i>Nyssa yunnanensis</i> W. C. Yin
OLACACEAE	<i>Schoepfia fragrans</i> Wall.
OLEACEAE	<i>Chionanthus ramiflorus</i> Roxb.
OLEACEAE	<i>Fraxinus floribunda</i> Wall.
OLEACEAE	<i>Jasminum attenuatum</i> Roxb. ex G. Don
OLEACEAE	<i>Jasminum lanceolarium</i> Roxb.
OLEACEAE	<i>Ligustrum sinense</i> Lour.
OLEACEAE	<i>Linociera insignis</i> C.B. Clarke
OLEACEAE	<i>Olea rosea</i> Craib
OXALIDACEAE	<i>Oxalis corniculata</i> L.
PAPILIONACEAE	<i>Craspedolobium schochii</i> Harms
PAPILIONACEAE	<i>Dalbergia assamica</i> Benth.
PAPILIONACEAE	<i>Dalbergia pinnata</i> (Lour.) Prain
PAPILIONACEAE	<i>Dalbergia stipulacea</i> Roxb.
PAPILIONACEAE	<i>Erythrina subumbrans</i> (Hassk.) Merr.
PAPILIONACEAE	<i>Fordia cauliflora</i> Hemsl.
PAPILIONACEAE	<i>Fordia microphylla</i> Dunn ex Z. Wei
PAPILIONACEAE	<i>Millettia leptobotrya</i> Dunn

PAPILIONACEAE	<i>Millettia pachycarpa</i> Benth.
PAPILIONACEAE	<i>Millettia tetraptera</i> Kurz
PAPILIONACEAE	<i>Millettia unijuga</i> Gagnep.
PAPILIONACEAE	<i>Mucuna pruriens</i> (L.) DC.
PAPILIONACEAE	<i>Ormosia fordiana</i> Oliv.
PAPILIONACEAE	<i>Ormosia olivacea</i> L. Chen
PAPILIONACEAE	<i>Pycnospora lutescens</i> (Poir.) Schindl.
PAPILIONACEAE	<i>Spatholobus pulcher</i> Dunn
PASSIFLORACEAE	<i>Passiflora siamica</i> Craib
PASSIFLORACEAE	<i>Passiflora wilsonii</i> Hemsl.
PINACEAE	<i>Pinus kesiya</i> Royle ex Gordon
PIPERACEAE	<i>Peperomia blanda</i> (Jacq.) Kunth
PIPERACEAE	<i>Peperomia heyneana</i> Miq.
PIPERACEAE	<i>Peperomia pellucida</i> (L.) Kunth
PIPERACEAE	<i>Peperomia tetraphylla</i> (G. Forst.) Hook. & Arn.
PIPERACEAE	<i>Piper chaudocanum</i> C. DC.
PIPERACEAE	<i>Piper flaviflorum</i> C. DC.
PIPERACEAE	<i>Piper longum</i> L.
PIPERACEAE	<i>Piper macropodium</i> C. DC.
PIPERACEAE	<i>Piper thomsonii</i> (C. DC.) Hook. f.
PIPERACEAE	<i>Piper yunnanense</i> Y.Q. Tseng
PITTOSPORACEAE	<i>Pittosporum kerrii</i> Craib
PLANTAGINACEAE	<i>Plantago erosa</i> Wall. ex Roxb.
PLANTAGINACEAE	<i>Plantago major</i> L.
POACEAE	<i>Fargesia plurisetosa</i> T.H. Wen
POACEAE	<i>Imperata cylindrica</i> (L.) P. Beauv.
POACEAE	<i>Microstegium ciliatum</i> (Trin.) A. Camus

POACEAE	<i>Setaria palmifolia</i> (J. König) Stapf
POACEAE	<i>Thysanolaena maxima</i> (Roxb.) Kuntze
PODOCARPACEAE	<i>Podocarpus neriifolius</i> D. Don
POLYGALACEAE	<i>Polygala arillata</i> Buch.-Ham. ex D. Don
POLYGALACEAE	<i>Polygala glomerata</i> Lour.
POLYGALACEAE	<i>Securidaca inappendiculata</i> Hassk.
POLYGONACEAE	<i>Polygonum chinense</i> L.
POLYGONACEAE	<i>Polygonum chinense</i> var. <i>hispidum</i> Hook. f.
POLYGONACEAE	<i>Polygonum chinense</i> var. <i>ovalifolium</i> Meisn.
POLYGONACEAE	<i>Polygonum hydropiper</i> L.
POLYGONACEAE	<i>Polygonum lapathifolium</i> L.
POLYGONACEAE	<i>Polygonum orientale</i> L.
POLYGONACEAE	<i>Polygonum perfoliatum</i> L.
PORTULACACEAE	<i>Portulaca oleracea</i> L.
PROTEACEAE	<i>Helicia cochinchinensis</i> Lour.
PROTEACEAE	<i>Helicia nilagirica</i> Bedd.
PROTEACEAE	<i>Helicia pyrrhobotrya</i> Kurz
PROTEACEAE	<i>Helicia reticulata</i> W.T. Wang
PROTEACEAE	<i>Helicia shweliensis</i> W.W. Sm.
PROTEACEAE	<i>Helicia silvicola</i> W.W. Sm.
PROTEACEAE	<i>Helicia tsaii</i> W.T. Wang
PROTEACEAE	<i>Heliciopsis terminalis</i> (Kurz) Sleumer
RANUCULACEAE	<i>Clematis fulvicoma</i> Rehder & E.H. Wilson
RANUCULACEAE	<i>Clematis peterae</i> Hand.-Mazz.
RANUCULACEAE	<i>Clematis subumbellata</i> Kurz
RHAMNACEAE	<i>Gouania leptostachya</i> DC.
RHAMNACEAE	<i>Hovenia acerba</i> var. <i>kiukiangensis</i> (Hu & Cheng) C. Y. Wu ex Y. L. Chen

RHAMNACEAE	<i>Rhamnus leptophylla</i> C.K. Schneid.
RHAMNACEAE	<i>Ventilago calyculata</i> Tul.
RHIZOPHORACEAE	<i>Carallia brachiata</i> (Lour.) Merr.
RHIZOPHORACEAE	<i>Carallia diplopetala</i> Hand.-Mazz.
ROSACEAE	<i>Cerasus cerasoides</i> (Buch.-Ham. ex D. Don) S.Y. Sokolov
ROSACEAE	<i>Docynia delavayi</i> (Franch.) C.K. Schneid.
ROSACEAE	<i>Duchesnea chrysantha</i> (Zoll. & Moritzzi) Miq.
ROSACEAE	<i>Eriobotrya bengalensis</i> var. <i>angustifolia</i> Cardot
ROSACEAE	<i>Eriobotrya obovata</i> W.W. Sm.
ROSACEAE	<i>Laurocerasus jenkinsii</i> (Hook. f.) Browicz
ROSACEAE	<i>Laurocerasus menghaiensis</i> T.T. Yu & L.T. Lu
ROSACEAE	<i>Laurocerasus zippeliana</i> (Miq.) Yu et Lu
ROSACEAE	<i>Photinia glabra</i> (Thunb.) Maxim.
ROSACEAE	<i>Potentilla kleiniana</i> Wight & Arn.
ROSACEAE	<i>Pygeum arboretum</i> (Bl.) C. Kalkman
ROSACEAE	<i>Pygeum topengii</i> Merr.
ROSACEAE	<i>Pyrus pashia</i> Buch.-Ham. ex D. Don
ROSACEAE	<i>Rubus pirifolius</i> Sm.
ROSACEAE	<i>Rubus poliophyllus</i> Kuntze
ROSACEAE	<i>Rubus rufus</i> var. <i>palmatifidus</i> Cardot
ROSACEAE	<i>Sorbus corymbifera</i> (Miq.) Khep & Yakovlev
ROSACEAE	<i>Sorbus globosa</i> T.T. Yu & Tsai
ROSACEAE	<i>Stranvaesia oblanceolata</i> (Rehder & E.H. Wilson) Stapf
RUBIACEAE	<i>Aidia cochinchinensis</i> Lour.
RUBIACEAE	<i>Brachytome hirtellata</i> var. <i>glabrescens</i> W.C. Chen
RUBIACEAE	<i>Canthium parvifolium</i> Roxb.
RUBIACEAE	<i>Discospermum fruticosum</i> (Hemsl.) Kuntze

RUBIACEAE	<i>Geophila herbacea</i> (Jacq.) K. Schum.
RUBIACEAE	<i>Hedyotis capitellata</i> var. <i>mollissima</i> (Pit.) W.C. Ko
RUBIACEAE	<i>Hedyotis diffusa</i> Willd.
RUBIACEAE	<i>Hedyotis scandens</i> Roxb.
RUBIACEAE	<i>Lasianthus inodorus</i> Bl.
RUBIACEAE	<i>Lasianthus lucidus</i> Bl.
RUBIACEAE	<i>Lasianthus sikkimensis</i> Hook.f.
RUBIACEAE	<i>Metadina trichotoma</i> (Zoll. & Moritzi) Bakh. f.
RUBIACEAE	<i>Mussaenda hossei</i> Craib
RUBIACEAE	<i>Mycetia gracilis</i> Craib
RUBIACEAE	<i>Ophiorrhiza mungos</i> L.
RUBIACEAE	<i>Oxyceros sinensis</i> Lour.
RUBIACEAE	<i>Psychotria symplocifolia</i> Kurz
RUBIACEAE	<i>Tarennoidea wallichii</i> (Hook. f.) Tirveng. & Sastre
RUBIACEAE	<i>Uncaria laevigata</i> Wall. ex G. Don
RUBIACEAE	<i>Uncaria sessilifructus</i> Roxb.
RUBIACEAE	<i>Wendlandia pingpienensis</i> F.C. How
RUBIACEAE	<i>Wendlandia scabra</i> Kurz
RUBIACEAE	<i>Wendlandia tinctoria</i> (Roxb.) DC.
RUTACEAE	<i>Acronychia pedunculata</i> (L.) Miq.
RUTACEAE	<i>Evodia austrosinensis</i> Hand.-Mazz.
RUTACEAE	<i>Evodia glabrifolia</i> (Champ. ex Benth.) C.C. Huang
RUTACEAE	<i>Evodia leptia</i> (Spreng.) Merr.
RUTACEAE	<i>Evodia leptia</i> var. <i>cambodiana</i> (Pierre) C.C. Huang
RUTACEAE	<i>Evodia simplicifolia</i> Ridl.
RUTACEAE	<i>Evodia trichotoma</i> (Lour.) Pierre
RUTACEAE	<i>Paramignya rectispina</i> Craib

RUTACEAE	<i>Toddalia asiatica</i> (L.) Lam.
SABIACEAE	<i>Meliosma simplicifolia</i> (Roxb.) Walp.
SABIACEAE	<i>Meliosma velutina</i> Rehder & E.H. Wilson
SALICACEAE	<i>Salix tetrasperma</i> Roxb.
SAMYDACEAE	<i>Casearia balansae</i> Gagnep.
SAMYDACEAE	<i>Casearia velutina</i> Blume
SAPINDACEAE	<i>Dimocarpus yunnanensis</i> (W.T. Wang) C.Y. Wu & T.L. Ming
SAPINDACEAE	<i>Nephelium chryseum</i> Blume
SAPINDACEAE	<i>Sapindus rarak</i> DC.
SAPOTACEAE	<i>Pouteria grandifolia</i> (Wall.) Baehni
SAPOTACEAE	<i>Sarcosperma arboreum</i> Buch.-Ham. ex C.B. Clarke
SAPOTACEAE	<i>Sarcosperma griffithii</i> Hook. f. ex C.B. Clarke
SAPOTACEAE	<i>Sarcosperma kachinense</i> var. <i>simondii</i> (Gagnep.) H.J. Lam & P. Royen
SAPOTACEAE	<i>Xantolis boniana</i> var. <i>rostrata</i> (Merr.) P. Royen
SAPOTACEAE	<i>Xantolis stenosepala</i> (Hu) P. Royen
SAPOTACEAE	<i>Xantolis stenosepala</i> var. <i>brevistylis</i> C.Y. Wu
SAURAUICEAE	<i>Saurauia cerea</i> Griff. ex Dyer
SAURAUICEAE	<i>Saurauia macrotricha</i> Kurz ex Dyer
SAURAUICEAE	<i>Saurauia miniata</i> C.F. Liang & Y.S. Wang
SAURAUICEAE	<i>Saurauia napaulensis</i> DC.
SAURAUICEAE	<i>Saurauia punduana</i> Wall.
SAURAUICEAE	<i>Saurauia yunnanensis</i> C.F. Liang & Y.S. Wang
SCHIZANDRACEAE	<i>Kadsura ananosma</i> Kerr
SCHIZANDRACEAE	<i>Kadsura angustifolia</i> A.C. Smith
SCHIZANDRACEAE	<i>Schisandra henryi</i> var. <i>yunnanensis</i> A.C. Sm.
SCHIZANDRACEAE	<i>Schisandra neglecta</i> A.C. Sm.
SCHIZANDRACEAE	<i>Schisandra plena</i> A.C. Sm.

SCROPHULARIACEAE	<i>Lindenbergia indica</i> (L.) Vatke
SLADENIACEAE	<i>Sladenia celastrifolia</i> Kurz
SOLANACEAE	<i>Lycianthes biflora</i> (Lour.) Bitter
SOLANACEAE	<i>Lycianthes biflora</i> var. <i>subtusochracea</i> Bitter
SOLANACEAE	<i>Solanum aculeatissimum</i> Jacq.
SOLANACEAE	<i>Solanum anguivi</i> Lam.
SOLANACEAE	<i>Solanum erianthum</i> D. Don
SOLANACEAE	<i>Solanum merrillianum</i> Liou
SOLANACEAE	<i>Solanum spirale</i> Roxb.
SOLANACEAE	<i>Solanum torvum</i> Sw.
STAPHYLACEAE	<i>Tapiscia yunnanensis</i> W.C. Cheng & C.D. Chu
STAPHYLACEAE	<i>Turpinia cochinchinensis</i> (Lour.) Merr.
STAPHYLACEAE	<i>Turpinia pomifera</i> (Roxb.) DC.
STEMONACEAE	<i>Stemona tuberosa</i> Lour.
STERCULIACEAE	<i>Pterospermum acerifolium</i> Willd.
STERCULIACEAE	<i>Reevesia pubescens</i> Mast.
STERCULIACEAE	<i>Reevesia thrsoidea</i> Lindl.
STERCULIACEAE	<i>Sterculia lanceifolia</i> Roxb.
STERCULIACEAE	<i>Sterculia lanceolata</i> Cav.
STYRACACEAE	<i>Bruinsmia polysperma</i> (Clarke) Steenis
STYRACACEAE	<i>Styrax grandiflorus</i> Griff.
STYRACACEAE	<i>Styrax rugosus</i> Kurz
STYRACACEAE	<i>Styrax tonkinensis</i> (Pierre) Craib ex Hartwich
SYMPLOCACEAE	<i>Symplocos sulcata</i> Kurz
SYMPLOCACEAE	<i>Symplocos wikstroemiifolia</i> Hayata
TACCACEAE	<i>Tacca chantrieri</i> André
THEACEAE	<i>Adinandra megaphylla</i> Hu

THEACEAE	<i>Camellia sinensis</i> var. <i>assamica</i> (J.W. Mast.) Kitam.
THEACEAE	<i>Camellia pachyandra</i> Hu
THEACEAE	<i>Camellia sinensis</i> (L.) Kuntze
THEACEAE	<i>Eurya aurea</i> H.T. Chang
THEACEAE	<i>Eurya austroyunnanensis</i> T.L. Ming & H. Chu
THEACEAE	<i>Eurya groffii</i> Merr.
THEACEAE	<i>Eurya jintungensis</i> Hu & L.K. Ling
THEACEAE	<i>Eurya persicaefolia</i> Gagnep.
THEACEAE	<i>Eurya pseudocerasifera</i> Kobuski
THEACEAE	<i>Gordonia chrysandra</i> Cowan
THEACEAE	<i>Pyrenaria yunnanensis</i> Hu
THEACEAE	<i>Schima argentea</i> E. Pritz.
THEACEAE	<i>Schima khasiana</i> Dyer
THEACEAE	<i>Schima wallichii</i> Choisy
THEACEAE	<i>Ternstroemia gymnanthera</i> (Wight & Arn.) Bedd.
THEACEAE	<i>Tutcheria pingpienensis</i> Hung T. Chang
THYMELEACEAE	<i>Eriosolena composita</i> (L. f.) Tiegh.
TILIACEAE	<i>Colona floribunda</i> (Wall. ex Voigt) Craib
TILIACEAE	<i>Microcos chungii</i> (Merr.) Chun
TILIACEAE	<i>Microcos paniculata</i> L.
ULMACEAE	<i>Celtis sinensis</i> Pers.
ULMACEAE	<i>Celtis timorensis</i> Span.
ULMACEAE	<i>Gironniera subaequalis</i> Planch.
ULMACEAE	<i>Trema orientalis</i> (L.) Blume
URTIACEAE	<i>Boehmeria macrophylla</i> Hornem.
URTIACEAE	<i>Debregeasia libera</i> Chien et C.J. Chen
URTIACEAE	<i>Debregeasia longifolia</i> (Burm. f.) Wedd.

URTIACEAE	<i>Debregeasia squamata</i> King ex Hook. f.
URTIACEAE	<i>Dendrocide sinuata</i> (Blume) Chew
URTIACEAE	<i>Oreocnide rubescens</i> (Blume) Miq.
VACCINIACEAE	<i>Agapetes lobbii</i> C.B. Clarke
VACCINIACEAE	<i>Agapetes mannii</i> Hemsl.
VACCINIACEAE	<i>Vaccinium exaristatum</i> Kurz
VERBENACEAE	<i>Callicarpa arborea</i> Roxb.
VERBENACEAE	<i>Callicarpa bodinieri</i> H. Lév.
VERBENACEAE	<i>Callicarpa cathayana</i> H.T. Chang
VERBENACEAE	<i>Callicarpa giraldii</i> Hesse ex Rehder
VERBENACEAE	<i>Callicarpa longifolia</i> Lam.
VERBENACEAE	<i>Clerodendrum bungei</i> Steud.
VERBENACEAE	<i>Clerodendrum colebrookianum</i> Walp.
VERBENACEAE	<i>Clerodendrum japonicum</i> (Thunb.) Sweet
VERBENACEAE	<i>Clerodendrum serratum</i> (L.) Moon
VERBENACEAE	<i>Clerodendrum serratum</i> var. <i>amplexifolium</i> Moldenke
VERBENACEAE	<i>Clerodendrum serratum</i> var. <i>herbaceum</i> (Roxb. ex Schauer) C.Y. Wu
VERBENACEAE	<i>Clerodendrum villosum</i> Blume
VERBENACEAE	<i>Premna scandens</i> Roxb.
VERBENACEAE	<i>Vitex quinata</i> var. <i>puberula</i> (H.J. Lam) Moldenke
VIOLACEAE	<i>Viola diffusoides</i> Ching J. Wang
VIOLACEAE	<i>Viola hossei</i> W. Becker
VITACEAE	<i>Ampelopsis cantoniensis</i> (Hook. & Arn.) Planch.
VITACEAE	<i>Cayratia timoriensis</i> var. <i>mekongensis</i> (C.Y. Wu) C.L. Li
VITACEAE	<i>Tetrastigma obovatum</i> (Lawson) Gagnep.
XANTHOPHYLLACEAE	<i>Xanthophyllum yunnanense</i> C.Y. Wu
ZINGIBERACEAE	<i>Amomum koenigii</i> J.F. Gmel.

ZINGIBERACEAE	<i>Boesenbergia rotunda</i> (L.) Mansf.
ZINGIBERACEAE	<i>Globba barthei</i> Gagnep.
ZINGIBERACEAE	<i>Globba racemosa</i> Sm.
ZINGIBERACEAE	<i>Globba schomburgkii</i> Hook. f.
ZINGIBERACEAE	<i>Rhynchanthus beesianus</i> W.W. Sm.